BOSTON PUBLIC LIBRARY
3 9999 09767 701 5

THE PUBLIC LIBRARY

OF THE

CITY OF BOSTON

FORM NO. 522: 1,[illegible],40: 3M.

PROPERTY OF THE Public Library of the City of Boston

Shelf No.
3844.50
V. 4

From the Bates Fund.

THE

NATURE-PRINTED

BRITISH SEA-WEEDS.

VOL. IV. CHLOROSPERMEÆ.

THE NATURE PRINTED BRITISH SEA WEEDS

JOHN LEIGHTON, F.S.A.

BY
W. G. JOHNSTONE
&
A. CROALL.

NATURE PRINTED
BY
HENRY BRADBURY.

LONDON.
BRADBURY & EVANS, 11, BOUVERIE St.
1859.

THE

NATURE-PRINTED

BRITISH SEA-WEEDS:

A HISTORY,

ACCOMPANIED BY FIGURES AND DISSECTIONS, OF THE ALGÆ OF THE BRITISH ISLES.

BY

WILLIAM GROSART JOHNSTONE, F.B.S.E.,

AND

ALEXANDER CROALL, A.B.S.E.

NATURE-PRINTED BY HENRY BRADBURY.

IN FOUR VOLUMES.

VOL. IV.—CHLOROSPERMEÆ.

LONDON:
BRADBURY AND EVANS, 11, BOUVERIE STREET.
1860.

Bdl.

257.926

Sept 26/78

BRADBURY AND EVANS,
PRINTERS EXTRAORDINARY TO THE QUEEN,
WHITEFRIARS.

TO

SIR WILLIAM JARDINE, BART., F.R.S., F.L.S.,

ETC., ETC.,

OF APPLEGARTH, DUMFRIES-SHIRE, SCOTLAND,

WHOSE FAME AS A NATURALIST, BOTH IN THE CLOSET AND FIELD,

IS EVERYWHERE KNOWN AND ACKNOWLEDGED;

WHOSE WORTH AS A LANDLORD AND COUNTRY GENTLEMAN AT HOME

IS UNIVERSALLY ADMITTED;

IN SINCERE ADMIRATION OF BOTH,

This Fourth and concluding Volume of

THE NATURE-PRINTED BRITISH SEA-WEEDS

IS, WITH ALL HONOUR, RESPECT, AND ESTEEM,

INSCRIBED BY

THE AUTHORS.

PREFACE.

The quaint old writers of the sixteenth century were wont to chat sunnily and lovingly, through page upon page of 'Preface' addressed to the 'Courteous Reader,' or 'Kind Reader,' or 'Honored Reader,' or, kindliest and gentlest of all, to 'Dear Hearts,' until *he* had been as the stone who went not with a 'God bless you' to the perusal of the book so goldenly, and not without spice of wit and wisdom, and deftest deprecation, introduced. Alas! that the days of such "linkëd sweetness, long drawn out" in Prefaces, are vanished; and doubly alas! that no Elia! no Robert Southey of 'The Doctor,' has written their epicedium. And yet the Editors of 'The British Algæ,' on concluding (for the time) their Book, feel greatly inclined to imagine the clock-of-time put back a couple of centuries, and to gossip and chat in old style with their 'Courteous,' 'Kind,' 'Honored' Readers and 'Dear Hearts' as in olden time.

First of all, the Editors have very great pleasure in presenting in their Book all promised in their Prospectus.

Next, the Editors may be permitted to congratulate themselves that they have been enabled to redeem their Prospectus in quality as well as in quantity and details. The Sea-weeds of Britain, they flatter themselves, are herein reproduced with all fidelity to structure, character and tint of the originals. The most crystalline water could scarcely more delicately float these lace-like trophies of the Garden of the Sea than do their pages.

Further, the Editors have, with all cordiality, to return their thanks to their numerous Correspondents and Contributors of specimens. It were "long to tell" all who have spontaneously, and with kind words, aided their somewhat arduous and not easily

appreciable researches and labours. While the Editors might leave unspecified not a few of the many, all will understand themselves to be included in their right-hearty thanks and most grateful acknowledgments.

Again, the Editors must very gratefully record the welcome everywhere extended to their Book by the 'Press' of all sections and countries. If they feel disposed to 'break a lance' with—to repay a Roland for an Oliver to their genial, albeit jestful and eke half-sarcastic reviewer in the 'Athenæum,' it must be understood as only in chivalric defence of the "ladies faire." Ah! thou 'Athenæum' critic, how could'st thou flout and sneer against lily-handed maidens so daintily occupied as were the gentle constituents of 'The British Algæ!' Fie! fie! And, most erudite 'Athenæum' critic, in thy twitting of our letter-press as too scientific, thou forgettest three things: (1.) Thy 'local' and provincial names should sound as barbaric and uncouth to other ears, yea, beyond thy native Village, as crabbedst Latin or Greek. (2.) Knowest thou not that Science must have its universal language? (3.) Knowest thou not that the Editors report, not impose, the names?

Finally, in view of after-gatherings and of after-enlargement of their Book, they would ask of all interested in the study of Algology to correspond with them as to any difficulties, and to send to them any good specimens; to favour them with any remarks they may have to make, and to correct any mistakes they may have observed. Again, with all good wishes to their friends, correspondents, and patrons, they would in the meantime say, all hail! and farewell.

WILLIAM GROSART JOHNSTONE.
ALEXANDER CROALL.

14, Park Place, Liverpool Road, Islington.
May 31*st*, 1860.

CONSPECTUS OF VOLUME IV.

Series IV.—CHLOROSPERMEÆ.

Fam. I. **SIPHONACEÆ.**—Green, marine or fresh-water Algæ, composed of continuous, tubular, simple or branched filaments (elongated cylindrical cells), free, or variously combined in cylindrical or expanded fronds. Containing:

Genus 1.—Codium.
2.—Bryopsis.
3.—Vaucheria.

Fam. II. **CONFERVACEÆ.**—Green, marine or fresh-water Algæ, composed of articulated filaments, simple or branched, free or invested by gelatine; cells cylindrical, truncate. Containing:

Genus 1.—Cladophora.
2.—Rhizoclonium.
3.—Conferva.
4.—Ochlochæte.

Fam. III. **ULVACEÆ.**—Green, or rarely purple, marine or fresh-water Algæ, composed of small polygonal cells, forming expanded membranes, or membranous tubes; very rarely arranged in filaments. Containing:

Genus 1.—Enteromorpha.
2.—Ulva.
3.—Porphyra.
4.—Bangia.

FAM. IV. **OSCILLATORIACEÆ.**—Green or blue, rarely purple, marine or (more frequently) fresh-water Algæ, composed of continuous, tubular, simple, or rarely branching filaments, either free or invested with gelatine; endochrome annulated, at length separating into lenticular sporidia. Containing:

Genus 1.—Rivularia.
2.—Schizosiphon.
3.—Schizothrix.
4.—Calothrix.
5.—Lyngbya.
6.—Microcoleus.
7.—Oscillatoria.
8.—Spirulina.

FAM. V. **NOSTOCHACEÆ.**—Green, fresh-water or rarely marine Algæ, composed of moniliform filaments, lying in a gelatinous matrix; cells globose or oval. Containing:

Genus 1.—Monormia.
2.—Sphærozyga.
3.—Spermosira.

FAM. VI. **PALMELLACEÆ.**—Cells contained in confervoid, simple or branching, tubular filaments. Containing:

Genus 1.—Hormospora.

ALPHABETICAL INDEX OF SPECIES.

VOLUME IV.

In every case where a blank occurs in the column denoting the number of the Plates, engraved magnified dissections, illustrative of that species, will be found at the conclusion of the descriptive text.

	Plate	Page
Bangia ceramicola	—	139
,, ciliaris	—	137
,, elegans	—	141
,, fusco-purpurea	—	135
Bryopsis hypnoides	CLXXXV.	13
,, plumosa	CLXXXIV.	11
Calothrix cæspitula	—	167
,, confervicola	—	153
,, fasciculata	—	157
,, hydnoides	—	165
,, luteola	—	155
,, pannosa	—	161
,, scopulorum	—	159
,, semiplena	—	163
Cladophora albida	CXCIV.	51
,, arcta	CXCVI.	57
,, Balliana	—	45
,, Brownii	—	21
,, diffusa	CLXXXIX.	33
,, falcata	—	63
,, flavescens	—	69
,, flexuosa	—	41

	Plate	Page
Cladophora fracta	—	71
,, Gattyæ	—	67
,, glaucescens	CXCVII.	61
,, gracilis	CXCII.	43
,, Hutchinsiæ	CLXXXVIII.	31
,, lætevirens	CXCI.	39
,, lanosa	CXCV.	53
,, Macallana	—	29
,, Magdalenæ	—	65
,, nuda	—	35
,, pellucida	CLXXXVI.	25
,, rectangularis	CLXXXVII.	27
,, refracta	CXCIII.	49
,, repens	—	23
,, Rudolphiana	—	47
,, rupestris	CXC.	37
,, uncialis	—	55
Codium adhærens	—	3
,, amphibium	—	5
,, bursa	—	1
,, tomentosum	CLXXXIII.	7
Conferva ærea	—	93
,, arenicola	—	77
,, arenosa	—	83
,, bangioides	—	97
,, collabens	—	95
,, implexa	—	81
,, linum	—	87
,, litorea	—	85
,, melagonium	—	91
,, sutoria	—	89
,, tortuosa	—	79
,, Youngana	—	99
Enteromorpha clathrata	—	113
,, compressa	CXCIX.	107
,, cornucopiæ	—	103
,, erecta	CC.	111

	Plate	Page
Enteromorpha Hopkirkii	—	117
,, intestinalis	CXCVIII.	105
,, Linkiana	—	109
,, percursa	—	119
,, Ralfsii	—	121
,, ramulosa	CCI.	115
Hormospora ramosa	—	209
Lyngbya Carmichaelii	—	173
,, Cutleriæ	—	179
,, ferruginea	—	171
,, flacca	—	177
,, majuscula	CCVII.	169
,, speciosa	—	175
Microcoleus anguiformis	—	181
Monormia intricata	—	195
Ochlochæte hystrix	—	101
Oscillatoria insignis	—	191
,, littoralis	—	183
,, nigro-viridis	—	187
,, spiralis	—	185
,, subuliformis	—	189
Porphyra laciniata	CCV.	129
,, vulgaris	CCVI.	131
Rhizoclonium Casparyi	—	75
,, riparium	—	73
Rivularia atra	—	145
,, nitida	—	147
,, plicata	—	143
Schizosiphon Warreniæ	—	149
Schizothrix Cresswellii	—	151
Spermosira Harveyana	—	207
,, litorea	—	205
Sphærozyga Berkeleyana	—	203
,, Broomei	—	201
,, Carmichaelii	—	197
,, Thwaitesii	—	199
Spirulina tenuissima	—	193

	Plate	Page
Ulva lactuca	CCIII.	125
,, latissima	CCII.	123
,, linza	CCIV.	127
Vaucheria marina	—	15
,, submarina	—	17
,, velutina	—	19

CONTENTS

OF THE SECOND PORTION OF THIS VOLUME.

PAGE

SKETCH OF THE HISTORY OF BRITISH SEA-WEEDS 219

SKETCH OF THE GEOGRAPHICAL DISTRIBUTION OF BRITISH SEA-WEEDS . 223

SKETCH OF THE STRUCTURE OF SEA-WEEDS 231

THE USES OF SEA-WEEDS 237

INSTRUCTIONS FOR COLLECTING, PRESERVING, AND ARRANGING ALGÆ FOR THE HERBARIUM—THEIR PREPARATION FOR THE MICROSCOPE AND CULTIVATION IN THE AQUARIUM 243

SYNOPSIS OF THE FAMILIES AND GENERA 251

SYNOPSIS OF THE SPECIES 259

BIBLIOGRAPHY 285

GLOSSARY 303

GENERAL INDEX 309

CODIUM BURSA.—*Ag.*

Gen. Char.—Frond soft and sponge-like, globular or more or less cylindrical; composed of somewhat loosely interwoven, inarticulate filaments, their vertical extremities forming the periphery of the frond, more or less inflated. Fructification: ovate or elliptical vesicles, filled with granular endochrome, and attached to the filaments of the periphery. Name from *κώδιον*, "the skin."

Codium *Bursa.*—Frond from a flat base of matted fibres, spherical and hollow.

Codium *Bursa.—Ag. Sp. Alg.* vol. i. p. 457; *Ag. Syst.* p. 178; *Grev. Alg. Brit.* p. 186; *Hook. Br. Fl.* vol. ii. p. 318; *Endl.* 3rd Suppl. p. 21; *Kütz. Phyc. Gen.* p. 309; *Kütz. Sp. Alg.* p. 502; *Harv.* in *Mack. Fl. Hib.* part 3, p. 233; *Harv. P. B.* plate 290; *Harv. Man.* p. 193; *Harv. Syn.* p. 159; *Atlas*, plate 61, fig. 284.

Spongodium *Bursa.—Lamour. Ess.* p. 73.

Lamarckia *Bursa.—Olivi, Zool. Adriat.* p. 258.

Agardhia *Bursa.—Cabrera*, fide *Ag.*

Fucus *Bursa.—Turn. Hist.* t. 136; *E. Bot.* t. 2183.

Alcyonium *Bursa.—Linn. Syst. Nat.* p. 1295.

Bursa *marina.—C. Bauhin, Pin.* p. 368; *Ray, Syn.* p. 31, No. 3.

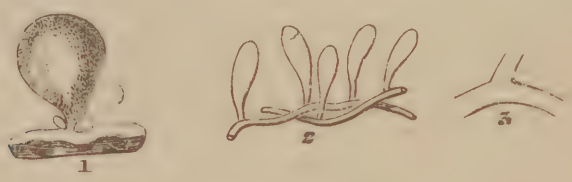
Hab.—On rocks. Perennial. Summer. Very rare. Coast of Sussex. Pallas (*Turner*); Shores of Cornwall (*Mr. Rashleigh*); Torquay (*Mrs. Griffiths*); Brighton (*Mr. Pike*); near Belfast (*Mr. Thompson*); Jersey (*Mr. F. P. Girdlestone*).

Geogr. Dist.—Atlantic shores of France and Spain; Mediterranean and Adriatic Seas.

Description.—Root, a broad flat expansion, composed of matted interwoven branching fibres. Fronds aggregate, sessile, spherical, and hollow, one to three inches or more in diameter; inner surface composed of delicate, cylindrical, branching and interwoven fibres, which are somewhat loosely matted together, and inarticulate; those forming the periphery vertical, slender at the base, more or less inflated towards the apices and clavate, closely packed but not glued together, and forming a soft spongy-like compressible elastic substance, of a deep green colour when fresh, passing into a pale yellowish white in decay. The inner filaments are nearly hyaline, those of the periphery filled with a dense dark green endochrome which gives the colour to the frond. Substance somewhat rigid, and but imperfectly adhering to paper in drying, during which the colour becomes much paler. Fructification we have not seen, and are not aware of its having been observed.

This curious species seems to be very rare in this country. Our specimens are very fine, and from Jersey ; this season they must be more than usually abundant, we having received no fewer than thirteen specimens from our correspondents there. On the west coast of France, however, and that of the Mediterranean, it seems to be common, generally growing in deep quiet bays, beyond the influence of the tides ; and although at one time said to be common on the Sussex coast, it is quite possible that the specimens may only have been picked from the beach, and have been "stray waifs" wafted from other shores.

The genus *Codium* are widely distributed both in the northern and southern hemispheres, and are likely to be found still more widely distributed than they are at present known to be, when their curious but not very attractive forms have received more attention.



CODIUM BURSA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Group of fronds, one-fourth natural size.
2.—Filaments of axis and periphery.
3.— Junction of same. Both magnified.

CODIUM ADHÆRENS.—*Ag.*

Gen. Char.—Frond soft and sponge-like, globular or more or less cylindrical ; composed of somewhat loosely interwoven, inarticulate filaments, their vertical extremities forming the periphery of the frond, more or less inflated. Fructification : ovate or elliptical vesicles, filled with granular endochrome, and attached to the filaments of the periphery. Name from κώδιον, "the skin."

Codium *adhærens.*—Frond consisting of procumbent, branching, interlacing filaments, forming a velvety crust on the surface of the rocks ; the surface composed of erect, simple, somewhat clavate filaments, closely compacted.

Codium *adhærens.—Ag. Sp. Alg.* vol. i. p. 467 ; *Ag. Syst.* p. 178 ; *Wyatt, Alg. Danm.* No. 127 ; *J. Ag. Medit.* p. 22 ; *Endl.* 3rd Suppl. p. 21 ; *Kütz. Phyc. Gen.* p. 309 ; *Mont. Pl. Cell. Canar.* p. 183 ; *Harv.* in *Hook. Journ.* vol. i. p. 305 ; *Harv. P. B.* plate 35 A. ; *Harv. Man.* p. 193 ; *Harv. Syn.* p. 159 ; *Atlas*, plate 72, fig. 288.

Hab.—On rocks in the sea, near low-water mark. Perennial. Summer and winter. Rare. Torquay (*Mrs. Griffiths*) ; Sermen Cove, Land's End (*Mr. Ralfs*) ; Gorren Haven and Gerrans Bay, Cornwall (*Mr. Peach*) ; Falmouth Harbour (*Miss Warren*) ; Rothlin Island, Antrim (*Mr. Moore*) ; Tory Island (*Mr. Hyndman*).

Geogr. Dist.—Atlantic coasts of Europe, from England to Spain ; Mediterranean Sea ; Canary Islands (*Webb*).

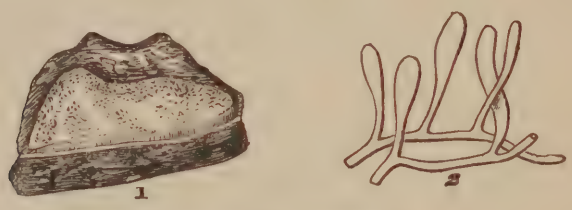
Description.—Frond crustaceous, spreading indefinitely over the rocks, forming a thin, closely appressed stratum of procumbent, branching, densely interwoven and matted filaments, from which arise at short but irregular intervals, innumerable, erect, simple, somewhat clavate filaments, to the same height, so as to form a level surface, closely compacted side by side, and resembling the pile on velvet ; the lower filaments closely attached to the rock by means of minute osculating radicles. Substance very soft and spongy, closely adhering to the paper in drying. Colour, a deep grass-green, changing to a pale yellowish white in decay, and often in drying. We have not seen the fruit of this species, nor any account of it.

This curious species seems confined in this country to the south-west or Atlantic shores of England, where it has hitherto been found in few localities, but has been no doubt often overlooked, from its obscure haunts and unattractive form.

We have not had the pleasure of seeing this singular production in a

growing state, but it is described as very much resembling a piece of bright green velvet spreading over the rock. Nor is this appearance merely superficial; the structure may be by no means inaptly compared to the same substance, the stratum of procumbent interwoven filaments being analogous to the cloth, and the erect filaments answering to the pile which is afterwards raised on the surface. The substance is therefore not only very correctly compared to velvet, but is in reality a piece of velvet woven in Nature's loom.

When fresh it is somewhat brittle and easily torn asunder, but when dry it is by no means destitute of tenacity.



CODIUM ADHÆRENS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Patch of *Codium adhærens*, natural size.
2.—Filaments of the axis and periphery, greatly magnified.

CODIUM AMPHIBIUM.—*Moore.*

Gen. Char.—Frond soft and sponge-like, globular or more or less cylindrical; composed of somewhat loosely interwoven, inarticulate filaments, their vertical extremities forming the periphery of the frond, more or less inflated. Fructification: ovate or elliptical vesicles, filled with granular endochrome, and attached to the filaments of the periphery. Name from κώδιον, "the skin."

Codium *amphibium.*—Fronds minute, erect, nearly cylindrical, obtuse, aggregated, arising from a thin stratum of filaments spreading indefinitely over the turf.

Codium *amphibium.—Moore et Harv.* in *Ann. Nat. Hist.* vol. xiii. (1844) plate 6, p. 321; *Harv. P. B.* plate 35 B.; *Harv. Man.* p. 194; *Harv. Syn.* p. 159; *Atlas*, plate 62, fig. 289.

Hab.—On turf-banks at high-water mark, near Roundstone, Galway (*Mr. M'Calla*).

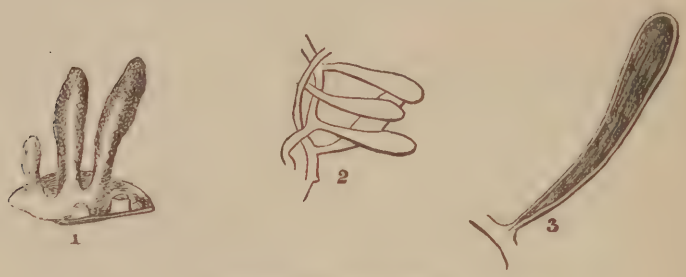
Geogr. Dist.—— ?

Description.—Frond consisting of a crustaceous base, spreading indefinitely over the turf, and composed of slender, branching, procumbent filaments, densely matted and interwoven, so as to form a thin spongy stratum, creeping over the damp turfy soil. From these arise numerous scattered minute papillæ or fronds, from one to three or four lines in height, and about half a line in diameter; these are composed of a central axis of very slender branching longitudinal filaments, from which spread out in all directions, horizontally (vertically to the axis), a dense mass of short, simple, slightly club-shaped filaments, of equal height, forming a level surface, and constituting the periphery of the papilla, which is nearly cylindrical, sometimes slightly clavate, rounded and obtuse at the apex. Of the fruit of this species we know nothing, and have seen no account of it.

This remarkable plant was discovered many years ago on the Galway coast by Mr. M'Calla, a well known algologist, and, so far as we are aware, it has not been found elsewhere.

It forms a thin stratum on the surface of the damp earth, spreading sometimes to considerable extent, but more frequently in little irregular patches on the broken ground, very soft and spongy, becoming much contracted when dry, and almost disappearing, but rapidly again imbibing the moisture, and becoming very conspicuous from its bright green colour.

The genus *Codium* may be described as containing plants, each of which is composed, like the "red snow," of a single cell; in that, however, the cell is simple and spherical, in the present genus it is vastly elongated and immensely ramified into a multiplicity of branches, everywhere covered with a coating of elongated papillæ, which are not separate cells, but simple papillæ arising from the surface of the other cells, with which they appear to have free communication.



CODIUM AMPHIBIUM.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Portion of *Codium amphibium.*
2.—Filaments of the axis and periphery.
3.—Vesicle. All magnified.

Plate CLXXXIII.

CODIUM TOMENTOSUM.—*Stack.*

Gen. Char.—Frond soft and sponge-like, globular or more or less cylindrical; composed of somewhat loosely interwoven, inarticulate filaments, their vertical extremities forming the periphery of the frond, more or less inflated. Fructification: ovate or elliptical vesicles, filled with granular endochrome, and attached to the filaments of the periphery. Name from κώδιον, "the skin."

Codium *tomentosum.*—Frond filiform, cylindrical, or more or less compressed, much branched; branches dichotomous or frequently secund.

Codium *tomentosum.—Stack. Ag. Sp. Alg.* vol. i. p. 452; *Ag. Syst.* p. 177; *Spreng. Syst. Veg.* vol. iv. p. 365; *Grev. Alg. Brit.* p. 185, t. 19; *Hook. Br. Fl.* vol. ii. p. 318; *Wyatt, Alg. Danm.* No. 35; *J. Ag. Alg. Medit.* p. 23; *Endl.* 3rd Suppl. p. 21; *Kütz. Phyc. Gen.* p. 309, t. 42, f. 1; *Montg. Canar. Crypt.* p. 182; *Pol. Leed.* p. 35; *Alger.* p. 48; *Harv.* in *Mack. Fl. Hib.* part 3, p. 232; *Harv. P. B.* plate 93; *Harv. Man.* p. 194; *Harv. Syn.* p. 160; *Atlas*, plate 61, fig. 285; *Harv. N. B. A.* part 3, p. 29.

Codium *elongatum.—Ag. Sp. Alg.* vol. i. p. 454; *Ag. Syst.* p. 177; *Endl.* 3rd Suppl. p. 21; *Montg. Alger.* p. 50, t. 13, f. 1.

Codium *lineare?—Ag.* l. c.

Codium *filiforme?—Mont. Alger.* p. 50, t. 10, f. 2.

Spongodium *tomentosum.—Lamour. Ess.* p. 73.

Spongodium *commune.—Bory, Dup. Voy. Bot.* p. 210.

Fucus *tomentosus.—Huds. Fl. Angl.* p. 514; *Stack. Ner. Brit.* t. 7; *Good. & Woodw.* in *Linn. Trans.* vol. iii. p. 195; *E. Bot.* t. 712; *Esper, Fuc.* t. 112; *Turn. Syn.* vol. ii. p. 300; *Hist.* t. 135.

Agardhia *dichotoma, areolata, et ramentacea.—Cabrera* in *Phys. Sällsk. Arsber.*

Hab.—On rocks in the sea, generally near low-water mark. Perennial. Summer. Common.

Geogr. Dist.—Common on all the shores of Europe. Also throughout the temperate and torrid portions of the Pacific, Atlantic, and Indian Oceans; New Holland, Tasmania, and Auckland Islands.

Description.—Root, a broad, flat, slightly convex, spongy mass of densely interwoven fibres, from one to several inches in extent, and from one to several lines in thickness. Fronds single or two or three together, sometimes numerous, generally from four to ten inches in length, but sometimes more, and occasionally eighteen inches or even "two feet" in

length, and from one and a-half to three or four lines in diameter at the base, whence it slightly tapers upwards to a rounded obtuse apex. When well grown, the branches are regularly dichotomous, from an inch to an inch and a-half, or even two inches in length in luxuriant specimens; the axils somewhat rounded, the apices occasionally slightly incrassated, composed of two strata of filaments; those of the axis longitudinal, very delicate, much branched, anastomosing, and interwoven; those of the periphery vertical, closely compacted and clavate, the apices very obtuse, to these vertical filaments are attached, by very short stalks, elongate-ovate vesicles filled with densely concentrated granular endochrome. These vesicles are not unfrequent, and are the only fructification that has been observed. The substance is rather firm and membranaceous, very imperfectly adhering to paper, but everywhere covered with a dense pile of short hyaline filaments, soft, and very gelatinous, which causes fresh specimens to adhere rather firmly. Colour, a rather bright green, often fading in the herbarium, and in the process of decay, to a pale yellowish white.

The most common and widely-distributed species of the genus said to occur on all the British shores. We have not seen specimens from the east coast, but have seen examples from many parts of the western shores, both of England and Scotland, and it is said to be common on the west coast of Ireland, where Professor Harvey finds a variety with the branches very much swollen below the forkings; this we have not seen, but a variety is by no means uncommon with the branches shorter, often fascicled and secund.

The species seems equally abundant, or even more so, in the southern hemisphere, as we have seen fine specimens from the shores of Australia, and possess some very pretty specimens either of this or very closely-allied species from its western shores.

The structure of the frond in this genus is most interesting, and seems to form a very natural connecting link between the preceding and following genera. Formed almost exactly in appearance after the model of some of the *Rhodosperms*, the real structure of the frond is totally different. When a section of any of the *Rhodosperms*, even of some of the more loosely compacted, is immersed in water, and placed on the field of the microscope, it is sometimes difficult to trace the form of the cells in the dense cement of gelatine in which they are imbedded. In *Codium*, however, there is no such obstruction. When a moderately thin slice of *Codium* is placed in water under the microscope, the fragments immediately separate and float freely in water, without the least apparent attachment, unless at points where they are not severed, so that here we require to have the slice sufficiently *thick* to show the entire

cells and their connexion ; whereas, in the other case, the difficulty often is to have them sufficiently *thin*, so as to be transparent enough to show the form and arrangement of the cells.

Sections of any of the species of *Codium* form easily prepared, and at the same time very interesting and beautiful objects for the microscope.

EXPLANATION OF PLATE CLXXXIII.

Fig. 1.—*Codium tomentosum*, natural size.
2.—Filaments of axis and periphery.
3.—One of the latter with a vesicle. Both magnified.

Codium tomentosum. Flack.

Nature Printed by Henry Bradbury.

Plate CLXXXIV.

BRYOPSIS PLUMOSA.—*Ag.*

Gen. Char.—Frond membranaceous, tubular, continuous, filiform, cylindrical, everywhere filled with granular endochrome. Fructification unknown. Name from *βρύον*, "a kind of moss;" *ὄψις*, "an appearance."

Bryopsis *plumosa*.—Frond simple below, repeatedly branched upwards; upper branchlets pectinato-pinnate.

Bryopsis *plumosa*.—*Ag. Sp. Alg.* vol. i. p. 448; *Syst.* p. 178; *Grev. Fl. Edin.* p. 307; *Grev. Alg. Brit.* p. 187, t. 19; *Hook. Br. Fl.* vol. ii. p. 318; *Wyatt, Alg. Danm.* No. 128; *J. Ag. Alg. Medit.* p. 21; *Endl.* 3rd Suppl. p. 20; *Mart. Fl. Braz.* vol. i. p. 11; *Kütz. Phyc. Gen.* p. 306; *Harv. P. B.* plate 3; *Harv. Man.* p. 194; *Harv. Syn.* p. 161; *Atlas*, plate 61, fig. 286; *Harv. N. B. A.* part 3, p. 32.

Bryopsis *Lyngbyæi*.—*Fl. Dan.* t. 1063; *Lyngb. Hyd. Dan.* p. 75, t. 19; *Spreng. Syst. Veg.* vol. iv. p. 365.

Ulva *plumosa*.—*Huds. Fl. Angl.* p. 571; *Engl. Bot.* t. 2375.

Hab.—On rocks, stones, and old shells, in the sea; also in tide-pools. Annual. Summer and autumn. Common.

Geogr. Dist.—Atlantic shores of Europe; Mediterranean Sea (*J. Agardh*); South Brazil (*Martius*); Falkland Islands (*Dr. Hooker*); Cape of Good Hope (*Dr. Harvey*).

Description.—Root, a mass of branching, matted fibres. Fronds much tufted, three to six inches or more in length, and from half a line to a line and a-half in diameter, filiform, nearly cylindrical, gradually tapering upwards to an obtuse point; at first quite simple, afterwards becoming pinnated above with regularly distichous pinnæ: these afterwards become elongated, and pinnated upwards in a similar manner; and in like manner, in luxuriant specimens, the same process is repeated until the frond becomes repeatedly pinnated and very bushy. The lower part, from one-half to two-thirds, of all the divisions is always quite naked, the pinnæ and pinnules cylindrical, with obtuse apices, and contracted just at the insertion, but not tapering, the lower divisions always longest, growing regularly shorter upwards, giving the whole frond and the branched part of the divisions an ovato-triangular outline; the whole frond is exceedingly lubricous, glossy, and sparkling, and closely adheres to paper. Colour, a deep green, becoming of a pale yellowish white in decay.

A beautiful plant, and widely distributed, but differing greatly in the development of its parts, according to locality. On the west coast of Ireland it seems to exhibit its greatest luxuriance, but on all our eastern shores is much more dwarfish, and sometimes but very sparingly branched, although there is, perhaps, no part of the British shores where it may not be found in greater or less quantity.

On the east coast of Scotland it is by no means abundant, but found in small quantity wherever there are rocks with sheltered corners and crannies, in which it can be often only detected by holding the hand or anything white near the bottom, when the dark green, rigid, simply pinnated fronds may be readily detected. They are seldom more than two inches in length, and are in striking contrast to those beautiful bunches of fronds that, more than half a foot in diameter, adorn the sheltered bays on the English and Irish coasts.

Nothing analogous to fruit has, so far as we are aware, been observed on any of the species.

EXPLANATION OF PLATE CLXXXIV.

Fig. 1.—*Bryopsis plumosa*, natural size.
2.—Branch.
3.—Bases of the pinnæ. Both magnified.

Bryopsis plumosa. Ag.

Plate CLXXXV.

BRYOPSIS HYPNOIDES.—*Lamour.*

Gen. Char.—Frond membranaceous, tubular, continuous, filiform, cylindrical, everywhere filled with granular endochrome. Fructification unknown. Name from *βρύον*, "a kind of moss;" *ὄψις*, "an appearance."

Bryopsis *hypnoides*.—Fronds very much branched; branches long, slender, more or less clothed towards the summit with somewhat irregularly inserted branchlets, which are often again repeatedly branched in a similar manner.

Bryopsis *hypnoides.—Lamour. Journ. Bot.* 1809, p. 135, t. 1, f. 2; *Grev. Alg. Brit.* p. 188; *Hook. Br. Fl.* vol. ii. p. 318; *Wyatt, Alg. Danm.* No. 81; *Harv.* in *Mack. Fl. Hib.* part 3, p. 233; *Harv. P. B.* plate 119; *Harv. Man.* p. 195; *Harv. Syn.* p. 161; *Atlas*, plate 61, fig. 287; *Harv. N. B. A.* part 3, p. 32.

Bryopsis *Arbuscula.—Ag. Sp. Alg.* vol. i. p. 451; *Ag. Syst.* p. 179; *Kütz. Phyc. Gen.* p. 307.

Hab.—On rocks, and parasitical on the smaller Algæ in tide-pools well shaded; also on *Laminaria saccharina*, beyond tide-marks. Annual. Summer. Not uncommon. All round our coasts.

Geogr. Dist.—Atlantic shores of Europe; Mediterranean Sea.

Description.—Root, a mass of branching, interwoven fibres. Fronds slender, very much branched, four to six inches or more in length; at first simple, as in the last species, at length branched towards the summit in a less regularly distichous manner; these again become elongated and branched towards the summit in a similar manner, and in luxuriant specimens this is repeated several times. Branches long, slender, and capillaceous, the ultimate ones exceedingly slender, all cylindrical, obtuse at the apices, and shortly constricted at the base, somewhat more distant, more regularly alternate, and much more delicate than in the last species. Substance very soft and lubricous, closely adhering to paper in drying. Colour, a fine lively green when fresh, but generally fades in drying to a pale yellowish green; the principal stems, but not the ramelli, being brightly polished as if varnished.

This species differs from the preceding chiefly in the greater slenderness and delicacy of all its parts, and in the somewhat less regularly

distichous branching, but these characters are sometimes rather in degree than in kind, and are mostly such as might be readily supposed to arise from a difference in locality, yet most authors have adopted the species without hesitation, some of them even without the least indication of a doubt. Continental authors, however, are in general so much given to the system of "hair-splitting" in species making, that this is less to be wondered at.

It is, perhaps, more frequently parasitical than the last species, and in sheltered bays on the west coast of Ireland is said to grow on the broad fronded variety of *Laminaria saccharina* to a very large size, forming bunches upwards of half a foot in diameter, and very much tufted and branched. It is among such specimens that the most characteristic forms of *B. hypnoides* are to be found, and such as one would not hesitate for a moment in separating from *B. plumosa*; but there are also often observed intermediate forms that serve as connecting links between the extremes, and often puzzle the student to know to which species he ought to refer them.

EXPLANATION OF PLATE CLXXXV.

Fig. 1.—*Bryopsis hypnoides*, natural size.
2.—Portion of branch, magnified.

Bryopsis hypnoides. Lamour.

VAUCHERIA MARINA.—*Lyngb.*

Gen. Char.—Frond membranaceous, tubular, continuous, filiform, cylindrical, very slightly branched, filled with dark green granular endochrome. Fructification: minute, lateral vesicles (coniocystæ), containing a deep green granular mass. Name in commemoration of M. Vaucher, a celebrated Swiss naturalist who wrote on the *Confervæ*.

Vaucheria *marina*.—Filaments erect, tufted, branched but slightly; branches cylindrical, apices obtuse; "vesicles scattered, obovate, shortly stalked."

Vaucheria *marina*.—*Lyngb. Hyd. Dan.* p. 79, t. 22; *Hook. Br. Fl.* vol. ii. p. 319; *Wyatt, Alg. Danm.* No. 168; *Harv. P. B.* plate 350 A.; *Harv. Man.* p. 195; *Harv. Syn.* p. 162; *Atlas*, plate 62, fig. 290.

Hab.—On mud, sand, and sea-plants, between tide-marks. Annual. Summer. Not uncommon.

Geogr. Dist.—Faroe Islands (*Lyngb.*).

Description. — Fronds cæspitose, erect, spreading indefinitely, generally less than an inch in height, sometimes rather more, very slightly and irregularly branched. Branches erect, long and slender, quite cylindrical, with obtuse apices, "the granular endochrome sometimes interrupted at long interspaces;" vesicles scattered, obovate, slightly stalked. Substance membranaceous, closely adhering to the paper in drying. Colour, a bright green, glossy when dry.

This simple vegetable production appears to be by no means uncommon, forming thin green patches of indefinite extent on the sand of the sea-shore, where it is readily observed after the recess of the tide. It is said also to grow on the smaller Algæ, but we have not seen it except on the sand, where it is not unfrequent towards the end of summer and in autumn.

VAUCHERIA MARINA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—Tuft, *Vaucheria marina*, natural size.
2.—Filament, magnified.
(Reduced from *Phyc. Brit.*)

VAUCHERIA SUBMARINA.—*Berk.*

Gen. Char.—Frond membranaceous, tubular, continuous, filiform, cylindrical, very slightly branched, filled with dark green granular endochrome. Fructification: minute, lateral vesicles (coniocystæ), containing a deep green granular mass. Name in commemoration of M. Vaucher, a celebrated Swiss naturalist who wrote on the *Confervæ*.

Vaucheria *submarina*.—"Forked fastigiate threads; coniocystæ (sporangia) numerous, lanceolate and ovate, confined to the upper branches."—*Berkeley* in *Phyc. Brit.*

Vaucheria *submarina*.—*Berk. Gl. Br. Alg.* p. 24, t. 8; *Hook. Br. Fl.* vol. ii. p. 319; *Harv. P. B.* plate 350 B.; *Harv. Man.* p. 195; *Harv. Syn.* p. 162; *Atlas*, plate 62, fig. 291.

Vaucheria *dichotoma*, β *submarina*.—*Ag. Syst. Alg.* p. 171; *Sp. Alg.* vol. i. p. 460; *Lyngb. Hyd. Dan.* p. 76, t. 20 A.; *Grev. Alg. Brit.* p. 190.

Hab.—On the muddy sea-shore, Weymouth (*Rev. J. M. Berkeley*).

Geogr. Dist.—North Sea.

Description.—"Plant growing in dense fastigiate masses in muddy spots, covered by the sea every tide. Threads far slenderer than in *V. dichotoma*; stained below by the mud, above dark green, forked. The branchlets generally somewhat strangulated just above their insertion; the main stem clothed, above the part where the branchlet is given off, with numerous, almost sessile, more or less ovate or lanceolate coniocystæ, which are pointed, at first entirely green, but eventually with a pellucid border. One single instance occurred in which the fruit consisted of two placed end to end."—*Ibid.*

We know nothing of this species, except from the above description and the accompanying figure, not having been fortunate enough to meet with it.

VAUCHERIA SUBMARINA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Tuft of *Vaucheria submarina*, natural size.
2.—Filament.
3.—Vesicle. Both magnified.

VAUCHERIA VELUTINA.—*Ag.*

Gen. Char.—Frond membranaceous, tubular, continuous, filiform, cylindrical, very slightly branched, filled with dark green granular endochrome. Fructification: minute, lateral vesicles (coniocystæ), containing a deep green granular mass. Name in commemoration of M. Vaucher, a celebrated Swiss naturalist who wrote on the *Confervæ*.

Vaucheria *velutina*.—Filaments creeping; branches erect, short, tufted, vesicles solitary on the branches, globose, more or less stalked.

Vaucheria *velutina*.—*Ag. Syst.* p. 312; *Hook. Br. Fl.* vol. ii. p. 319; *Kütz. Syst. Alg.* p. 487; *Harv. P. B.* plate 321; *Harv. Man.* p. 196; *Harv. Syn.* p. 162; *Atlas*, plate 62, fig. 292.

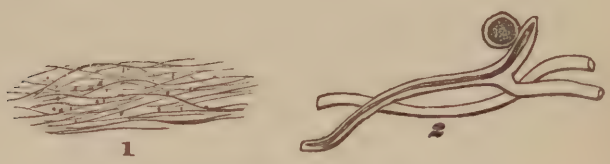
Hab.—On muddy shores, and on mud-covered rocks, commonly near half-tide level. Annual. Spring and summer. Not uncommon.

Geogr. Dist.—Shores of Europe.

Description.—Forming widely spreading strata, the creeping filaments firmly fixed in the muddy bank on which it grows, often many feet, or even yards in extent, often densely matted and interwoven. Branches erect, cylindrical, obtuse, from half a line to a line in height, forming a close soft velvety cushion when well developed; but often the upright branches are not abundant, and the greater part of the filaments are procumbent. These are mostly colourless, and partly imbedded in the mud, "the larger portion of them being usually dead, with a very offensive odour." The erect branches are of a bright green colour, at least in the upper part, the base being often colourless as the decumbent parts. Spherical vesicles, filled with a dark green granular mass, are not unfrequent, generally on the erect branches, but occasionally also on the procumbent ones; sometimes sessile, but more frequently with more or less evident stalks. Substance membranaceous, closely adhering to paper in drying.

The genus *Vaucheria* is not remarkable for the beauty of its species, most of them being obscure and inconspicuous plants, delighting in the soft muddy beach, or the bare banks that fringe the sea-shore, where the present species, the most conspicuous of those natives of this country, often forms very extensive strata, sometimes very apparent from the abundance and bright green colour of the branches, but more frequently only observable when carefully looked for.

On the east coast of Scotland, *V. velutina* is not scarce, and we have gathered the fruit as late as December or even January, in very good condition.



VAUCHERIA VELUTINA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Vaucheria velutina*, natural size.
2.—Filaments, magnified.

CLADOPHORA BROWNII.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *Brownii*. — Filaments erect, rigid, slightly branched, forming dense cæspitose patches on the surface of the rock; branches long, mostly simple, erect or erecto-patent; articulations four to six times longer than broad, lower somewhat clavate, upper cylindrical.

Cladophora *Brownii.—Harv. P. B.* plate 30; *Harv. Man.* p. 199; *Harv. Syn.* p. 163; *Atlas*, plate 62, fig. 293.

Conferva *Brownii.—Dillw.* Suppl. t. D.; *Ag. Syst. Alg.* p. 105; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 355; *Harv.* in *Mack. Fl. Hib.* part 3, p. 228; *Harv. Man.* 1st edit. p. 134; *Wyatt, Alg. Danm.* No. 225; *E. Bot.* Suppl. t. 2879.

Conferva *pulvinata.—R. Brown MSS.*

Hab.—In situations exposed to the alternate influence of salt and fresh water. Rare. Perennial. On wet rocks in a cave near Dunrea (*Mr. R. Brown*); on rocks at the entrance of a small cave beyond Black Castle, Wicklow, 1833 (*Dr. Harvey*); Cornwall coast (*Mr. Ralfs*).

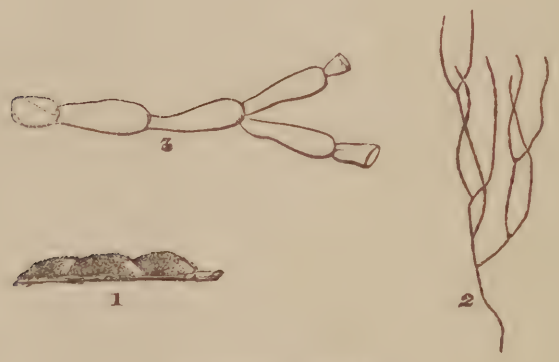
Geogr. Dist.—Ireland; Cornwall.

Description.—Tufts dense, spreading over the rock in broad indefinite patches, filaments erect in the middle, somewhat decumbent towards the circumference, half an inch or rather more in height, of a dark green colour in the mass, but the separate filaments present a pale rather bright green, filaments rather rigid and crisp, in the mass somewhat harsh to the feel, and not very elastic. Filaments slightly branched; branches long, slender, simple or once or twice divided, mostly erect and subdichotomous, occasionally subpatent and secund, somewhat flexuous, scarcely tapering upwards, the apices rather obtuse. Articulations, nearly uniform in length, at first clavate, upper cylindrical, joints contracted, endochrome dense.

The present species seems to have as much title to belong to the fresh water or even the land Algæ as to the marine, as it appears to be always found where it is as much exposed to the influence of fresh as of salt water. Our specimens were collected "in the south of England,

under dripping rocks, and covered at high tides," where the salt water may have had but very little to do in their production. Still it is perhaps as well to give it a place among marine forms, as it is likely to be met with by collectors on the sea-shore, and, being a native of the marshes, it may, in the present imperfect state of our knowledge of its history, be considered as a doubtful subject of either kingdom.

It is said to form beautiful, rather harsh, dark green, velvety patches on its native rocks, sometimes several inches in extent, circular, but often irregular, from the confluence of the patches and the intervention of irregularities in the surface of the rock, and may not be so unfrequent as supposed in habitats suited to its peculiar taste.



CLADOPHORA BROWNII.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Tuft, *Cladophora Brownii*, natural size.
2.—Filament.
3.—Portion of same. Both magnified.
(Reduced from *Phyc. Brit.*)

CLADOPHORA REPENS.—*J. Ag.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *repens*.—"Forming dense cushion-shaped or globular tufts; filaments short, capillary, densely matted together, rising from root-like fibres, slightly branched; branches erect, subsimple or forked, naked, or with a few distant, secund ramuli; articulations cylindrical, very long (ten to twenty times as long as their diameter)."—*Phyc. Brit.*

Cladophora *repens*.—*Harv. P. B.* plate 236; *Harv. Man.* p. 199; *Harv. Syn.* p. 163; *Atlas*, plate 66, fig. 306; *Harv. N. B. A.* part 3, p. 73.

Conferva *repens*.—*J. Ag. Alg. Medit.* p. 13.

Œgagropila *simplex*.—*Lenorm.* in *Herb. T. C. D.*

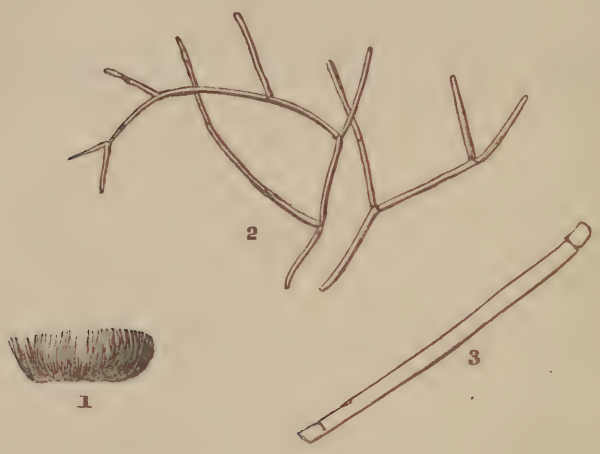
Hab.—Thrown on shore after a gale. Annual? Summer. Jersey (*Miss Turner*).

Geogr. Dist.—Shores of the Mediterranean Sea; Atlantic coast of France (*Lenormand*).

Description.—"Tufts very dense, an inch or two in breadth, and about half an inch in thickness, globose or oblong, cushion-like, composed of innumerable capillary filaments closely matted together. The filaments are at first decumbent, connected by root-like fibres, which form the substratum of the tufts; from the decumbent filaments issue at the joints erect branches half an inch in length, simple or once forked, and either naked or furnished with a few simple, distant, secund ramuli: Each branch consists of about four or five, rarely more, articulations; and each ramulus usually of one, rarely of two, articulations. The articulations are therefore of great length, as compared with their diameter; in our specimen the length is frequently as much as twenty times the breadth; they are cylindrical, and the diameter at the top of the branches is as great as at the base. The colour appears to have been a dark green; it is dingy, and somewhat olive-green in the dried state. The substance is rigid, and the plant does not adhere to paper when dry."—*Phyc. Brit.*

Of this curious species we know nothing beyond the description and figure in the work above quoted, and are not aware whether any other

specimens than those above referred to have been met with. It is remarkable among its congeners for its simple subpatent (?) branches, and the extraordinary length of the articulations. The fibrous radicles on the lower part of the filaments assimilate it with *C. arcta* and its allies.



CLADOPHORA REPENS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Cladophora repens*, natural size.
2.—Filaments.
3.—Single cell. Both magnified.
(Reduced from *Phyc. Brit.*)

Plate CLXXXVI.

CLADOPHORA PELLUCIDA.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *pellucida*.—Filaments rather stout, rigid, and suberect, much branched; branches dichotomous "or trichotomous," suberect, arising from the summit of every one of the very long cylindrical articulations.

Cladophora *pellucida*.—*Kütz. Phyc. Gen.* p. 271; *Harv. P. B.* plate 174; *Harv. Man.* p. 199; *Harv. Syn.* p. 163; *Atlas*, plate 63, fig. 294.

Conferva *pellucida*.—*Huds. Fl. Angl.* p. 601; *Dillw. Conf.* t. 90; *E. Bot.* t. 1716; *Ag. Syst.* p. 120; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 357; *Harv.* in *Mack. Fl. Hib.* part 3, p. 228; *Wyatt, Alg. Danm.* No. 193; *J. Ag. Alg. Medit.* p. 13; *Harv. Man.* 1st edit. p. 135.

Hab.—In deep rock-pools, generally near low-water mark. Annual. Summer. Not uncommon on the shores of England and Ireland; not found in Scotland.

Geogr. Dist.—Atlantic shores of Europe and America; Mediterranean Sea; Cape of Good Hope (*Dr. Harvey*).

Description.—Root, a minute, flat, conical disc; filaments solitary or several together, three to six inches high or more, rather stout at the base, and naked for about an inch or an inch and a half, becoming gradually more slender upwards at each ramification, much branched. Branches cylindrical, dichotomous or trichotomous, arising from the upper angles of each of the articulations, which are eight to ten times longer than their diameter, quite cylindrical, the branch being only about one-half the diameter of that from which it springs. Such is the primary mode of branching, but the articulations are often more or less proliferous, sometimes densely so, when the tufts become very thick and bushy, and all traces of the normal ramification is lost, except in the younger or secondary growth, in which it may in general be traced. Substance rather rigid, membranaceous, not very perfectly adhering to paper. Colour, a fine bright rather pleasant green, becoming paler in age.

One of our most handsome species, and one which, as Professor Harvey justly remarks, " there is seldom much difficulty in determining ;" indeed, with well-grown specimens, there can be no difficulty at all, and, even in those bushy species that occur in the end of the season, the long articulations, every one of which bears on its apex two branches, afford a character which can hardly be mistaken.

It is said to be "not uncommon on the shores of England and Ireland," frequenting deep, quiet, clear rock-pools, where it forms a handsome object, spreading its light, delicate, and graceful fronds freely in the water, as they seldom become matted, even when very bushy, owing to the strength and rigidity of the branches.

This species appears to be not unfrequent on the Irish coast, and is occasionally met with on those of England, chiefly on the west ; we are not aware of its occurrence in Scotland, and have seen no Scotch specimens ; even English ones are not readily procured, and seem to be rather uncommon.

EXPLANATION OF PLATE CLXXXVI.

Fig. 1.—*Cladophora pellucida*, natural size.
2.—Single cell, greatly magnified.

Cladophora Pellucida, Kütz.

Nature Printed by Henry Bradbury.

Plate CLXXXVII.

CLADOPHORA RECTANGULARIS.—*Griff.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *rectangularis*.—Filaments capillaceous, much tufted and entangled, repeatedly branched; primary branches distant, closer and shorter upwards, all opposite, very patent, everywhere furnished with short opposite pinnæ; articulations rather more than twice as long as broad, somewhat constricted at the dissepiments.

Cladophora *rectangularis*.—*Harv. P. B.* plate 12; *Harv. Man.* p. 200; *Harv. Syn.* p. 164; *Atlas*, plate 63, fig. 295.

Conferva *rectangularis*.—*Griff. MSS.*; *Harv.* in. *Hook. Br. Fl.* vol. ii. Suppl. p. 10; *Wyatt, Alg. Danm.* No. 145; *Harv. Man.* 1st edit. p. 135.

Conferva *Crouani*.—*Chauv. MSS.* sec. *Berk.* in *Litt.*

Hab.—In deep water. Annual. Summer. Torquay, cast on shore, very rare (*Mr. Borrer* and *Mrs. Griffiths*); Galway (*Mr. Reilly*); Dredged in Roundstone Bay, County Galway, in four to six fathoms, very abundant (*Mr. W. M'Calla*); Great Arran, Galway Bay, abundant (*Mr. Andrews*).

Geogr. Dist.—— ?

Description.—Root, a mass of minute interwoven fibres; filaments capillaceous, very fine, much tufted and entangled, six to twelve inches or more in length, without branches at the base for one or two inches, then with two or three series of branches, distant, and very irregular in length, quite patent or horizontal and opposite. All the branches and branchlets, together with the main stem, furnished at the apex of each articulation with a pair of short spine-like ramuli or pinnæ, which are often partially abraded from the lower part of the main stem, and are sometimes of equal length throughout, at other times short ones of a line or so in length are mixed with others from one to six lines or more in length, horizontally patent, cylindrical, obtuse, and jointed. Articulations about two or three times as long as their diameter, somewhat inflated in the middle, and constricted at the dissepiments. Substance rather firm, rigid, membranous, not adhering to the paper

in drying. Colour, a fine pleasant yellowish green, becoming paler when dry.

This very beautiful and quite peculiar species seems no less remarkable for its abundance in some places than for its rarity in others. On the west of Ireland it seems particularly abundant, at least in several places, but everywhere else it is very rare; and although it will no doubt yet be found to occur in many places where it has not yet been observed, its peculiarly well-marked characters render it much less likely to be overlooked than some other more closely allied species. Its generally short, horizontally patent ramuli, with which the plant is everywhere furnished, from the base to the apex, constitute a character so constant and peculiar that it can hardly be mistaken for any other.

Its favourite habitat is "large sheltered bays with a hard bottom, where it forms beautiful stellated tufts, which spread on the bottom, and are often more than a foot in diameter, frequently becoming confluent, and forming extensive strata. It is torn up by the storms and cast on shore in large quantities, and is then employed along with other Algæ as manure."

Professor Harvey forms two varieties, the one with the ramuli short, and of equal length, the other having them more elongated, and of very unequal lengths.

EXPLANATION OF PLATE CLXXXVII.

Fig. 1.—*Cladophora rectangularis*, natural size.

2. —Portion of branch, magnified.

CLADOPHORA rectangularis. GRIFF.

Printed by Henry Bradbury.

CLADOPHORA MACALLANA.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *Macallana*.—Filaments very delicate, rigid, capillaceous, flexuous, much branched and entangled; branches alternate, sometimes opposite or secund, zigzag, patent, frequently recurved, ultimate ramuli short, apices obtuse; articulations about twice as long as their diameter.

Cladophora *Macallana*.—*Harv. P. B.* plate 84; *Harv. Man.* p. 200; *Harv. Syn.* p. 164; *Atlas*, plate 63, fig. 296.

Hab.—On the sandy bottom of the sea, in four to ten fathoms water. Annual. Summer. Dredged in Roundstone Bay, abundantly (*Mr. M'Calla*).

Geogr. Dist.—West of Ireland.

Description.—Root fibrous; filaments very slender, rigid, capillaceous, six to twenty inches in length; very much tufted and entangled, repeatedly branched. Branches alternate, rarely opposite, frequently secund, especially upwards, cylindrical, short, more or less zigzag and flexuous, very irregular in length, ultimate ramuli very short, mostly secund, cylindrical, and obtuse; very patent and recurved, the axils wide but not rounded. Articulations about twice or twice and a half as long as their diameter, cylindrical, sometimes slightly contracted at the dissepiments, the apical ones mostly ovate. Substance rather rigid, membranaceous, very imperfectly adhering to the paper in drying; endochrome rather dense and granular. Colour, a deep green, rather paler when dried.

This beautiful species is somewhat related to the preceding, and is found in the same locality, but apparently in rather less abundance, from the difficulty we have experienced in procuring specimens.

It is dedicated to the memory of Mr. M'Calla, an indefatigable and acute naturalist, of Roundstone, who has done much to elucidate the interesting phycology of the Irish coast, and who unfortunately fell a victim to the cholera in 1849, greatly lamented by all who knew him.

We have not heard of any other locality than that of its discoverer recorded in *Phycologia Britannica*, where he and also Dr. Harvey found it

abundantly ; it seems, however, to be much less plentifully thrown on shore than that species, or at least to be much less known as a shore plant.

From the last species it may be readily distinguished by the regularly alternate or secund, not opposite, branches and ramuli.

CLADOPHORA MACALLANA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Portion of a branch, magnified.
2.—The same, more magnified.
(From *Phyc. Brit.*)

Plate CLXXXVIII.

CLADOPHORA HUTCHINSIÆ.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *Hutchinsiæ*.—"Filaments setaceous, of equal diameter throughout, rigid, crisp, glaucous green, flexuous, tufted, bristling; ramuli erecto-patent, simple, or furnished along the inner face with short processes of one or two articulations, apices very obtuse; articulations twice to thrice as long as broad, the joints contracted."—*Phyc. Brit.*

Cladophora *Hutchinsiæ*.—*Harv. P. B.* plate 124; *Harv. Man.* p. 201; *Harv. Syn.* p. 165; *Atlas*, plate 63, fig. 297.

Conferva *Hutchinsiæ*.—*Dillw. Conf.* t. 109; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 357; *Harv.* in *Mack. Fl. Hib.* part 3, p. 229; *Harv. Man.* 1st edit. p. 135; *Wyatt, Alg. Danm.* No. 226.

Hab.—In clear tide-pools, commonly near low-water mark. Annual. Summer. Not uncommon.

Geogr. Dist.—Atlantic shores of Europe.

Description.—Root composed of short clasping fibres; filaments very slender and much branched, four to twelve inches or more in length, densely tufted, and slightly entangled, rather crisp and rigid; branches of moderate length, mostly alternate below, with few distant branches mostly secund upwards, the ramuli short and tooth-like, ultimate ones of from one to three joints, all cylindrical, and the apices obtuse; sometimes straight, but more frequently flexuous, erecto-patent, the angles rather acute. Articulations from one and a half to twice as long as their diameter, sometimes a little longer, and nearly uniform in all parts of the plant, elliptical, very slightly contracted at the dissepiments, endochrome dark green, granular. Substance rather rigid, membranaceous, not very firmly adhering to the paper.

This seems chiefly to differ from the preceding in its stronger and more robust growth, the much less patent or recurved branches, and in the more constricted dissepiments; in other respects it certainly comes

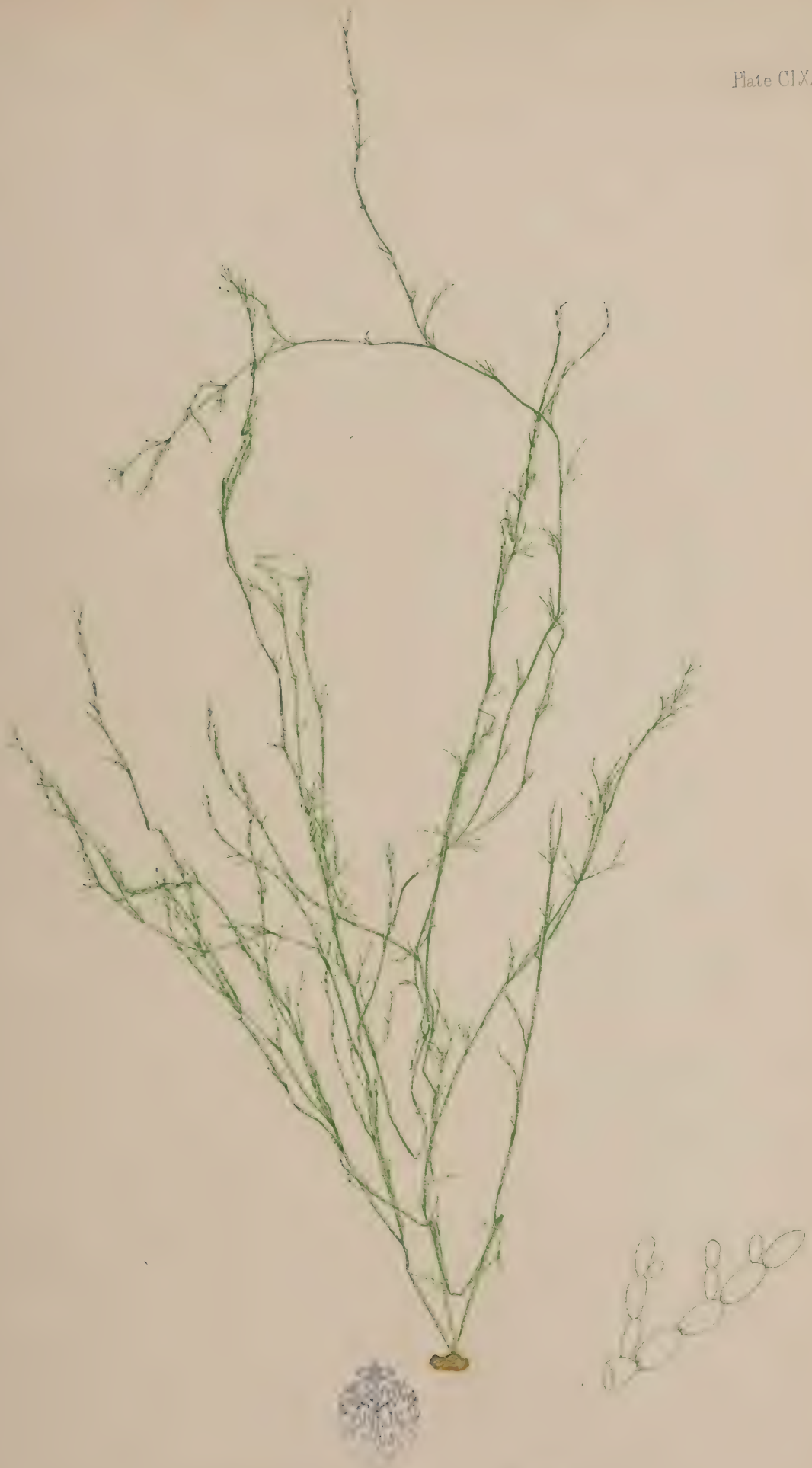
very near that species, much nearer, indeed, than its different locality would lead us to suppose.

It is named as a tribute to the memory of Miss Hutchins, near Bantry, whose name has become among botanists almost a household word, on account of her numerous discoveries in that neighbourhood, not only in marine botany, but in every department of natural history. To the Algæ, however, she was particularly devoted, and if the halo of honour which already endears her to the botanist can be at all deepened by connecting her name with a humble Alga, of which we entertain grave suspicions, few, certainly, are more worthy of the honour.

C. Hutchinsiæ is a beautiful species, and when growing in its own native pool, has rather a peculiar aspect, from the stout rigid stems, and rather squarrose look of the upper branches. From these characters the practised eye will not find much difficulty in distinguishing the species.

EXPLANATION OF PLATE CLXXXVIII.

Fig. 1.—*Cladophora Hutchinsiæ*, natural size.
2.—Portion of branch, magnified.



Cladophora Hutchinsiae. Harv.

Lith. Printed by Henry Goodbury

Plate CLXXXIX.

CLADOPHORA DIFFUSA.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched ; filaments articulated. Fructification : "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear ;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *diffusa*.—"Filaments subsetaceous, loosely tufted, rigid, dark, or full green, flexuous, much branched ; branches distant, elongated, irregularly subdivided or somewhat dichotomous, furnished towards the top with a few secund, simple ramuli ; articulations three to four times longer than broad."—*Phyc. Brit.*

Cladophora *diffusa*.—*Harv.* in *Hook. Br. Fl.* vol. ii. p. 358 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 229 ; *Harv. P. B.* plate 130 ; *Harv. Man.* p. 201 ; *Harv. Syn.* p. 165 ; *Atlas*, plate 64, fig. 298 ; *Harv. N. B. A.* part 3, p. 83 ; *Roth, Cat. Bot.* vol. ii. p. 207, t. 7 ; *Dillw. Conf.* t. 21 ; *E. Bot.* t. 2289 ; *Ag. Syst.* p. 116 ; *Wyatt, Alg. Danm.* No. 144 ; *J. Ag. Alg. Medit.* p. 13.

Conferva *distans*.—*Ag. Syst.* p. 120.

Hab.—On rocks, stones, and old shells, in pools between tide-marks. Annual. Summer. Not uncommon.

Geogr. Dist.—Atlantic shores of Europe ; Mediterranean Sea.

Description.— Root consisting of short curved, rather stout fibres ; filaments slender, somewhat tufted, four to eight inches or more in length, much branched ; branches alternate, dichotomous or secund, rather long, slender, and distant, but very irregular ; ultimate ramuli few, long, slender, and mostly secund, many-jointed. Main branches more or less flexuous, sometimes zigzag, but never recurved, rather erect, with acute axils, and rounded obtuse extremities. "Joints tolerably uniform in all parts of the plant, twice, thrice, or four times as long as broad," very slightly constricted at the dissepiments, or almost cylindrical. Substance rather rigid, and very imperfectly adhering to paper. Colour, a deep green, paler when dry and in age.

At first sight this species appears sufficiently distinguished from the preceding in its long, slender, many-jointed ramuli, and longer more

cylindrical joints ; but these characters, we fear, will be found, on careful investigation, to be rather too inconstant and unsatisfactory to be altogether relied on.

The species is, perhaps, not of unfrequent occurrence on the British coasts, but in the present imperfect and unsatisfactory state of our knowledge of the genus *Cladophora*, and indeed of all the *Confervaceæ*, we can hardly speak with any certainty on the distribution of any of the species.

In such simple plants it is often no easy matter to fix upon characters sufficiently available for separating the species—the length and form of the joints, the degree and mode of ramification, and the colour, are the characters most readily available, and these are confessedly extremely variable. The root might afford another character, it may be, more constant, but that is not always procurable, and collectors are not always sufficiently careful to procure it, even when it might be obtained. In selecting specimens for scientific purposes, no portion of the plant should be wanting, even although obtained in separate fragments.

EXPLANATION OF PLATE CLXXXIX.

Fig. 1.—*Cladophora diffusa*, natural size.
2.—Portion of branch, magnified.

CLADOPHORA NUDA.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *nuda*.—"Filaments somewhat rigid, slender, very straight, dull green or olivaceous (when dry), sparingly dichotomous; ramuli few and scattered, appressed, the uppermost often opposite; articulations many times longer than broad."—*Phyc. Brit.*

Cladophora *nuda*.—*Harv. P. B.* plate 351; *Harv. Man.* p. 101; *Harv. Syn.* p. 166; *Atlas*, plate 66, fig. 307.

Conferva *nuda*.—*Harv.* in *Mack. Fl. Hib.* part 3, p. 229; *Harv. Man.* 1st edit. p. 136.

Hab.—On basalt rocks, between tide-marks. At Port Stewart, Co. Antrim (*Mr. D. Moore*).

Geogr. Dist.——?

Description.—"Filaments loosely tufted, two or three inches high, capillary, sparingly branched, very straight, irregularly forked or subalternately divided; secondary branches distant, and very erect, of various lengths, naked or furnished with a few very erect or appressed, short ramuli, the upper ones of which are occasionally opposite. These ramuli are scarcely more slender than the other parts of the frond, and end in a bluntish point. The articulations in the older parts are many times longer than their breadth, and have thick walls, leaving a wide space surrounding the dull green endochrome; the dissepiments are slightly contracted. The substance is rather rigid, and without gloss; and in drying the plant does not adhere to paper."—*Ibid.*

With this species we are wholly unacquainted, and are not aware of any other specimen having been found than the one in the herbarium of the Dublin University, a specimen collected many years ago on the coast of Antrim, by Mr. Moore, as we are informed in *Phyc. Brit.*, and where we are assured that "it is undoubtedly nearly related to *C. rupestris*, from which at first sight it differs, by its duller colour and more naked branches, and especially by the much longer articulations of the stem, and the wider borders of the tube." Of these characters, the only one

of any value is the length of the articulation, and that even is very variable. The colour, if the specimen has been gathered off the rock, is of some value, but we have often seen specimens of *C. rupestris* quite destitute of colour, and it is not uncommon in all the species for the thread of endochrome to become contracted, giving the walls of the cell the appearance of much greater thickness than they at first present.

CLADOPHORA NUDA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Cladophora nuda*, tuft, natural size.
2.—Filaments.
3.—Joints. Both magnified.

1

2

Cladophora diffusa Harv.

Nature Printed by Henry Bradbury.

Plate CXC.

CLADOPHORA RUPESTRIS.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *rupestris*.—Fronds much tufted, and branched; branches opposite or quaternate; ramuli mostly opposite, elongate, cylindrical, suberect, and straight; articulations two to four times as long as broad.

Cladophora *rupestris*.—*Kütz. Phyc. Gen.* p. 270; *Harv. P. B.* plate 180; *Harv. Man.* p. 201; *Harv. Syn.* p. 166; *Atlas*, plate 64, fig. 299; *Harv. N. B. A.* part 3, p. 74.

Conferva *rupestris*.—*Linn. Sp. Pl.* p. 1637; *Huds. Fl. Angl.* p. 601; *Lightf. Fl. Scot.* p. 994; *With. Br. Pl.* vol. iv. p. 140; *Fl. Dan.* t. 948; *Roth, Cat. Bot.* vol. ii. p. 238; *Dillw. Conf.* t. 23; *E. Bot.* t. 1699; *Ag. Syn.* p. 91; *Lyngb. Hyd. Dan.* p. 156, t. 54; *Ag. Syst.* p. 117; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 357; *Wyatt, Alg. Danm.* No. 95; *Harv.* in *Mack. Fl. Hib.* part 3, p. 229; *Harv. Man.* p. 136.

Conferva *glauca*.—*Roth, Cat. Bot.* vol. ii. p. 208, t. 6.

Conferva *virgata*.—*Roth, Cat. Bot.* vol. i. p. 195.

Var. β *distorta*.—Filaments short, much curled, and matted together; ramuli squarrose.

Hab.—On rocks between tide-marks as well as in deep water. Annual. Summer and autumn. Common. β. On submarine peat, at Birturbin Bay, Connemara (*Mr. M'Calla*).

Geogr. Dist.—Atlantic shores of Europe; Baltic Sea.

Description.—Root ("excepting var. β"), a minute conical disc. Filaments rather harsh and rigid, very much tufted and bushy, four to six inches long or more; primary filaments rather stout, branched from the very base. Branches repeatedly divided, long, slender, and remarkably straight, erect, and scarcely tapering, but each successive ramification being of somewhat less diameter than the one from which it sprung; ultimate ramuli very slender, erect, straight, and cylindrical to the apical joint, which is more or less conical, and somewhat acute, occasionally with another series of ramuli commencing, and, not unfrequently, the branches become so dense, that the primary mode of branching can with

difficulty be detected. Articulations at first somewhat inflated in the middle, afterwards cylindrical, and at length somewhat contracted, in the older parts four to five, in the younger, three to four times longer than their diameter. Substance rather rigid, and not very perfectly adhering to paper. Colour, a fine deep dark green, often with a glaucous tint, not changing in drying, but bleaching to a yellowish or dirty white by the weather.

When in perfection, this is certainly one of the most beautiful species of British *Cladophora*, as it is also one of the most common, and generally diffused on the British shores, being found in greater or less abundance on every rocky shore, and forming a constituent part of the vegetation of every zone from near high-water mark to a considerable distance below the influence of the tide, increasing in the beauty and luxuriance of its fronds, and the depth of their colour, to the lowest level of the tides and beyond, where, and in deep tide-pools, it is always covered with water, its long, pencil-like fronds reflecting tints of the deepest glaucous green, beautifully contrasted with the brilliant *Rhodosperms* by which they are surrounded ; it is really one of the most beautiful objects with which these lovely pools, each in itself a mine of gems, is furnished, and almost induces one to regret that to its other recommendations it does not add that of rarity also.

EXPLANATION OF PLATE CXC.

Fig. 1.—*Cladophora rupestris*, natural size.
2.—Branch, magnified.

Cladophora rupestris. Kütz.

Nature Printed by Henry Bradbury.

Plate CXCI.

CLADOPHORA LÆTEVIRENS.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *lætevirens*.—Fronds rather rigid, much branched, and bushy; branches patent or erecto-patent, rather short and crowded, more or less flexuous, especially the larger ones; ultimate ramuli forked or secund, tapering upwards to an obtuse point; articulations of the principal branches five to six times as long as their diameter, those of the ramuli three to four.

Cladophora *lætevirens*.—*Kütz. Phyc. Gen.* p. 267; *Harv. P. B.* plate 190; *Harv. Man.* p. 202; *Harv. Syn.* p. 167; *Atlas*, plate 74, fig. 300; *Harv. N. B. A.* part 3, p. 82.

Cladophora *ægæa*.—*Kütz. Phyc. Gen.* p. 266.

Conferva *lætevirens*.—*Dillw. Conf.* t. 48; *E. Bot.* t. 1854; *Harv. Man.* p. 137; *Lyngb. Hyd. Dan.* p. 154; *Ag. Syst.* p. 107; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 357; *Harv.* in *Mack. Fl. Hib.* part 3, p. 228; *Wyatt, Alg. Danm.* No. 143.

Conferva *glomerata*, β *marina*.—*Roth, Cat. Bot.* vol. iii. p. 237; *Lyngb. Hyd. Dan.* p. 154; *Ag. Syst.* p. 107; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 357; *Harv.* in *Mack. Fl. Hib.* part 3, p. 228; *Wyatt, Alg. Danm.* No. 143.

Hab.—On rocks, stones, old shells, and other Algæ between tide-marks. Annual. Summer. Common.

Geogr. Dist. —— ?

Description.—Root, a minute disc. Filaments rather stout, very much branched, and bushy, three to five inches or more in length, densely tufted; principal branches somewhat patent, rather short and crowded, very unequal in length, straight or more frequently flexuous and zigzag, pointing in all directions, occasionally opposite, alternate, or secund, especially upwards; ultimate ramuli mostly forked or secund, composed of from one to three articulations, and tapering upwards to a very obtuse point. Articulations of the principal branches five to six times longer than their diameter, those of the ramuli three to four

times longer, cylindrical, not contracted at the dissepiments. Substance rather rigid, but soon becoming flaccid, and adhering to the paper. Colour a deep green when young, becoming paler in age, and then losing its colour when dry.

This is rather a handsome species when well grown, but its growth is frequently rather stunted, especially when found in shallow tide-pools, growing on the smaller Algæ, corallines, or even on other species of *Cladophora*, as *C. rupestris*. In such cases it is often not above two or three inches in length, and the branches very short and crowded. In the deeper pools, and on the rocks or larger Algæ, it often grows to a much larger size, the branches are longer and more distant, less flexuous, and more erect. When young, the colour is a fine deep green, but, like most of the species, its colour fades as it grows older, at least after a certain period, and when fully matured, it soon fades into a pale yellow or dirty white.

It appears to be a species of not uncommon occurrence, but is no doubt often confounded with other species, such as *C. albida*, &c. From that species it may generally be known by its more bushy habit, shorter and more crowded branches, and more forked, and less secund ramuli.

But it is subject to considerable variation in its growth, from the varying circumstances under which it is placed, and the substance on which it grows, as well as the different seasons at which it is gathered.

EXPLANATION OF PLATE CXCI.

Fig. 1.—*Cladophora lætevirens*, natural size.
2.—Portion of branch.
3.—Same. Both magnified.

Cladophora laetivirens. Kütz.

CLADOPHORA FLEXUOSA.—*Griff.*

GEN. CHAR.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion. Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

CLADOPHORA *flexuosa*.—"Filaments capillary, flexuous, or angularly bent, pale green, much branched; the branches of unequal length, and, comparatively but little divided, set with curved secondary or tertiary branches, which are pectinated with secund, short, simple, spreading ramuli; articulations of the branches thrice or four times, of the ramuli twice as long as broad."—*Phyc. Brit.*

CLADOPHORA *flexuosa*.—*Griff.!* in *Wyatt, Alg. Damn.* No. 227; *Harv. P. B.* plate 353; *Harv. Man.* p. 202; *Harv. Syn.* p. 167; *Atlas*, plate 64, fig. 301; *Harv. N. B. A.* part 3, p. 78.

CLADOPHORA *sirocladia*, β *gracilis*.—*Kütz. Sp. Alg.* p. 392.

HAB.—In rock-pools between tide-marks, attached to Corallines and other Algæ. Probably common.

GEOGR. DIST. —— ?

DESCRIPTION.—Root (?) Filaments long, slender, and flexuose, very much tufted and branched, three to six inches long; main branches long and distant, and frequently bent at the axes in a zigzag manner, very irregular in their insertion, generally scattered, frequently alternate or dichotomous, of very unequal lengths, again furnished with a second or third, and even fourth series of smaller and shorter ramuli, all very irregular, the ultimate ramuli secund, either wholly or in alternate sets of from one to five, erecto-patent, the axils acute, the apices very slightly tapering and obtuse. Substance rather flaccid, and closely adhering to the paper. Colour, a rather pale, pleasant green.

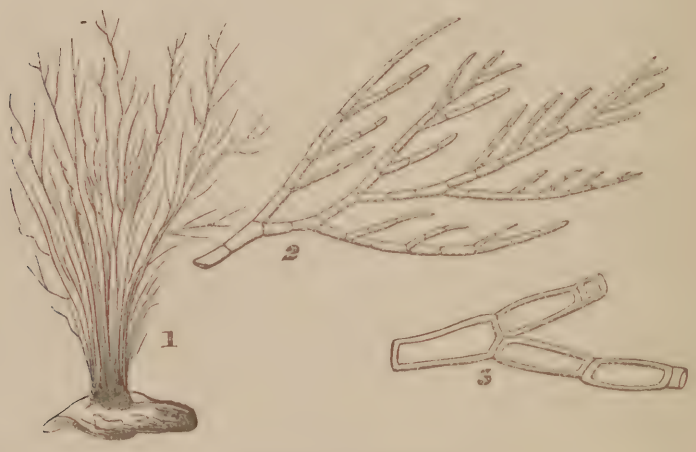
If we understand this species, it seems to be one of our most common species, being found wherever there are clear, shallow rock-pools, between tides, often near high-water mark, generally growing on Corallines, and other small Algæ, such as *Cladophora rupestris*, &c.

In general the colour is rather pale, but this cannot be depended on, as all plants growing in shallow rock-pools, much exposed to the sun, soon come to maturity, from the water getting warm, and then soon pass into

decay, and consequently soon lose the colour; those, however, in deeper water are more permanent in the colour. We have specimens of almost every shade of colour, from a rather deep green to a yellowish white.

It is a common plant in such situations on the east coast of Scotland, and exactly agrees in habit and character with specimens from Dr. Dickie, collected by the late Mrs. Griffiths.

As a species we are sorry that we cannot express our confidence in its stability, being too nearly allied, we fear, to *C. glaucescens*, perhaps also to *C. albida*, and through it to *refracta*, and even *gracilis* possibly, so unsatisfactory are the characters on which these species are dependent.



CLADOPHORA FLEXUOSA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Filament, natural size.
2.—Branch.
3.—Portion of same. Both magnified.

Plate CXCII.

CLADOPHORA GRACILIS.—*Griff.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *gracilis.*— Filaments very slender and flexuous, much tufted and matted together, much branched; branches patent or recurved, often zigzag; ultimate ramuli secund, long, straight, or slightly curved inward; articulations three to five times longer than their diameter.

Cladophora *gracilis.*—*Harv. P. B.* plate 18; *Harv. Man.* p. 202; *Harv. Syn.* p. 168; *Atlas*, plate 65, fig. 302; *Harv. N. B. A.* part 3, p. 81.

Conferva *gracilis.*—*Griff.* in *Wyatt, Alg. Damn.* No. 97; *Harv.* in *Mack. Fl. Hib.* part 3, p. 230; *Harv. Man.* 1st edit. p. 137.

Hab.—On the larger Algæ in three to six fathoms. Annual. Summer. Not uncommon.

Geogr. Dist. —— ?

Description.—Filaments very slender, densely tufted and entangled, much branched from the base. Branches rather short, flexuous, or zigzag, very patent or even recurved, axils very wide but acute; ultimate ramuli closely pectinate, secund either wholly or in sets, rarely alternate or scattered, of six to nine articulations, long, slender, and tapering, erecto-patent, straight, or slightly curved inwards, especially towards the base, the axils rather acute, apices obtuse. Articulations very unequal, but nearly uniform throughout the whole plant, short ones and long ones being often placed contiguous, three to five times as long as their diameter, dissepiments scarcely constricted. Substance rather firm and rigid, very imperfectly adhering to paper. Colour, a rather bright but pleasant green when young, paler in age, and, when dry, somewhat glossy and silky.

A very pretty species, and perhaps not at all uncommon on rocky shores, remarkable for its soft, silky, shining fronds, and the long, slender, attenuated ramuli, yet we are by no means certain that the species is a good one. From *C. flexuosa* it is chiefly distinguished by

its glossy surface, more patent branches, long, slender, and attenuated ramuli, and from *C. Rudolphiana* in its stronger and more rigid fronds, the shorter articulations, and somewhat less patent and lengthened ramuli. We are not sure, however, that these characters might not all be the result of a different habitat : the present species being generally found in a depth of water intermediate between the other two, *C. flexuosa* being generally an inhabitant of pools, often shallow ones, near high-water mark ; *C. gracilis* about low-water mark, and *C. Rudolphiana* in a depth of several fathoms. These differences in habitat must assuredly have an effect on the habit of the plant ; the question then becomes whether locality be sufficient to produce the difference, and this, with our present knowledge, will be no easy problem to settle.

EXPLANATION OF PLATE CXCII.

Fig. 1.—*Cladophora gracilis*, natural size.
2.—Branch.
3.—Portion of same. Both magnified.

Cladophora gracilis. Griff.

CLADOPHORA BALLIANA.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *Balliana*.—"Filaments elongate, extremely slender, soft, grass-green, much branched; the branches excessively divided, the penultimate ones virgate and set with slender, secund, one or two jointed ramuli; articulations of the branches eight to ten times as long as broad, of the ramuli six to eight times, all filled with dense, granular endochrome; dissepiments broad and hyaline."—*Phyc. Brit.*

Cladophora *Balliana*.—*Harv. P. B.* plate 356; *Harv. Syn.* p. 168; *Atlas*, plate 65, fig. 303.

Hab.—At Clontarf (*Miss Ball*, May 16, 1843).

Geogr. Dist. —— ?

Description.—"Filaments finer than human hair, from six to eight or ten inches long, tufted and much branched, the branching repeatedly alternate, but irregular and difficult to trace, with a more or less evident leading stem; lesser branches one or two inches long, somewhat virgate, undivided, set with other minor branches, which again bear numerous short, pectinate ramuli, generally along their inner faces. These ramuli are much more slender than the joint from which they spring, and usually consist of but two cells, but occasionally lengthen out into several. The branches and lesser divisions taper at the extremity into a slender point. The endochrome filling the cells is remarkably dense, and in great measure recovers its form on remoistening after the plant has been dried, and is of a full grass-green. The length of the cells in the principal divisions is from eight to ten times their diameter, or perhaps more; in the ramuli the cells are shorter. The border of the tube and the dissepiments are both very wide in proportion to the part occupied by endochrome. The substance is soft and tender, and the plant closely adheres to paper in drying."—*Phyc. Brit.*

We know nothing of this species except what we learn from *Phyc. Brit.*, where it is beautifully figured and very fully described.

We are not aware of its occurrence in recent times. It seems a rather well marked species in the difficult and unsatisfactory group to which it belongs, and we hope it may stand the test of time and future examination.

It has been named in honour of Miss Ball, by the learned author of *Phyc. Brit.*, as an acknowledgment of the many obligations under which botanists are laid for her discoveries in Irish phycology.

Its nearest ally is *C. Rudolphiana*, from which it is chiefly distinguished by the very erect branches. The "branches are remarkably slender, and the tufts very soft and lubricous."

CLADOPHORA BALLIANA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Cladophora Balliana*, one-fourth natural size.
2.—Portion of a filament, magnified.
3.—Portion of same, greatly magnified.

CLADOPHORA RUDOLPHIANA.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *Rudolphiana*.—Filaments capillaceous, very slender, cylindrical, somewhat flexuous, much tufted, excessively branched and interwoven; branches patent and very irregular, forked, opposite or secund; ultimate ramuli long, slender, mostly secund, very much attenuated towards the apices; articulations very unequal, those of the main branches many times longer than their diameter, those of the branches much shorter, with here and there elliptical swellings; "their granular endochrome somewhat spiral.

Cladophora *Rudolphiana*.—*Kütz. Phyc. Gen.* p. 268; *Harv. P. B.* plate 86; *Harv. Man.* p. 203; *Harv. Syn.* p. 169; *Atlas*, plate 65, fig. 304; *Harv. N. B. A.* part 3, p. 80.

Conferva *Rudolphiana*.—*Ag.* in *Bot. Zeit.* vol. x. p. 636; *J. Ag. Alg. Medit.* p. 12.

Conferva *Kaneana*.—*M'Calla, Alg. Hib.* No. 29.

Hab.—Parasitical on various *Laminariæ* and other sea plants, in two to six fathom water. Annual. Summer. Very abundant in Roundstone Bay; Connemara (*Mr. M'Calla*); Falmouth (*Miss Warren*).

Geogr. Dist.—Adriatic Sea (*Agardh!* v. in *Herb. Hook.*).

Description.—Filaments excessively tufted, slender, and interwoven, forming dense, matted, and when old, inextricable bundles, six to eight or "twenty inches" in length, very flaccid, soft, and silky, from the extreme tenuity of the filaments; very much branched. Branches very patent, irregular, sometimes opposite, sometimes alternate, sometimes dichotomous; axils very patent, but not rounded; ultimate ramuli very long, slender, and tapering to a rather acute point, mostly secund, either wholly, or in series of one to two, or more, sometimes alternate or forked, erecto-patent, slightly curved. Articulations very long and cylindrical, those of the main branches very unequal, eight to twelve times longer than their diameter, generally shorter in each series of branches; those of the ramuli four to six times longer than their diameter, quite cylindrical, the upper ones slightly contracted at the

dissepiments ; elliptical swellings are here and there scattered among the upper branches, endochrome bright green and granular, and often collected in one part of the cell even when the swelling is not perceptible.

This is one of the most delicate and beautiful of the genus, and looks, when young, like very fine silk ; the individual filaments are so fine as hardly to be perceptible to the naked eye, and even when spread upon paper they are only distinguishable in the mass. In the upper branches it closely resembles *C. gracilis*, but the articulations are even here longer, and those of the principal branches are still more elongated, constituting one of its essential characters.

The great peculiarity of the species, however, is the elliptical swellings in the cells of the upper branches, by which it is at once distinguished from every other British species of *Cladophora*. These swellings appear to be somewhat analogous to those observed in *Conferva litorea*, but in that species they are swollen in pairs, whereas in the present they are only swollen singly, and the endochrome is often collected in a deeper coloured mass in one part of the cell or articulation, even when the swelling is not apparent.

The colour is generally well preserved in drying.

CLADOPHORA RUDOLPHIANA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Cladophora Rudolphiana*, tuft, natural size.
2.—Portion of filament, magnified.

Plate CXCIII.

CLADOPHORA REFRACTA.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *refracta*.—Main filaments rather rigid, much tufted, and somewhat entangled, greatly branched; branches capillaceous, spreading irregularly on all sides, very patent, or frequently recurved, set with repeatedly pectinato-secund ramuli, which are mostly on their upper side; articulations two to three times as long as their diameter.

Cladophora *refracta*.—*Kütz. Phyc. Gen.* p. 267; *Harv. P. B.* plate 24; *Harv. Man.* p. 203; *Harv. Syn.* p. 169; *Atlas*, plate 65, fig. 305; *Harv. N. B. A.* part 3, p. 79.

Conferva *refracta*.—*Roth, Cat. Bot.* vol. ii. p. 193; *Ag. Syst.* p. 114; *Harv. Man.* 1st edit. p. 137; *Wyatt, Alg. Danm.* No. 228.

Hab.—In clear rock-pools left by the tide, near low-water mark. Annual. Summer. Not uncommon.

Geogr. Dist.—Baltic Sea; shores of the British Islands.

Description.—Filaments densely tufted, rather rigid, and much entangled, forming brush-like bundles, of from three to five inches in length, much branched. Branches very patent or even recurved, very irregular, mostly alternate or dichotomous, sometimes opposite, furnished with a second, third, or fourth series of branchlets, which are capillaceous, gradually shorter upwards, horizontally patent, or frequently very much recurved, pectinate-pinnate, or mostly secund on the upper side; "very frequently a minute ramulus stands opposite to a pectinated branchlet," the lower ramuli the longest, gradually shorter upwards, and frequently somewhat curved outwards. Articulations two to three times as long as their diameter, all cylindrical, scarcely tapering upwards, but each series diminishing in diameter and very slightly in length upwards, apical ones slightly tapering to a rounded obtuse point; dissepiments not contracted. Substance rather rigid, and very imperfectly adhering to the paper. Colour, when young, a bright green; when past maturity, gradually fading into a yellowish white.

At first sight this would appear to be a good species, the very patent and even recurved branches forming a striking contrast with the straight erect ones of its nearest allies, *C. albida* and *flexuosa*.

From these characters at least it will not in general be difficult to distinguish them ; but it sometimes happens that intermediate forms will unceremoniously make their appearance and prove very perplexing.

Professor Harvey very justly remarks that the species generally prefers clear rock-pools, for the most part near low-water mark, where it runs no risk of being left nearly dry even at the lowest tides, and unlike *C. rupestris* and some other species which delight in the shade, it loves to vegetate in open, not weedy pools, where it can enjoy the full refulgence of the summer sun.

When floating in its native element it wants some of the soft, silky delicacy of some of its congeners, but the greater degree of rigidity makes its fronds spread out and float more freely in the water, and gives it a lightness and delicacy of character peculiarly its own.

EXPLANATION OF PLATE CXCIII.

Fig. 1.—*Cladophora refracta*, natural size.
2.—Portion of a filament.
3.—Joints. Both magnified.

Cladophora refracta Kütz.

Nature Printed by Henry Bradbury

Plate CXCIV.

CLADOPHORA ALBIDA.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *albida*.—Filaments extremely slender, flaccid, and silky, densely tufted and very much branched; branches very irregular in length and direction, suberect or patent, main branches mostly opposite, ramuli mostly secund; articulations three to five times as long as their diameter.

Cladophora *albida*.—*Kütz. Phyc. Gen.* p. 267; *Sp. Alg.* p. 400; *Hassall*, p. 224; *Harv. P. B.* plate 275; *Harv. Man.* p. 203; *Harv. Syn.* p. 170; *Atlas*, plate 69, fig. 324; *Harv. N. B. A.* part 3, p. 80.

Conferva *albida*.—*Huds. Fl. Ang.* p. 595; *Dillw. Conf.* p. 66, t. E.; *E. Bot.* t. 2327: *Harv.* in *Hook. Br. Fl.* vol. ii. p. 358; *Harv.* in *Mack Fl. Hib.* part 3, p. 229; *Harv. Man.* 1st edit. p. 138; *Wyatt, Alg. Danm.* No. 96.

Hab.—On rocks, stones, and Algæ, between tide-marks, near low-water mark. Annual. Summer. Not uncommon.

Geogr. Dist.—Shores of Europe.

Description.—Filaments forming densely bushy and entangled tufts, four to eight inches or more in length, extremely slender and cylindrical, scarcely tapering, and but slightly diminishing in diameter upwards, very much branched. The branches inextricably interwoven, and when the plants are old twisted into rope-like bundles, frequently opposite, occasionally alternate or secund, extremely slender and cylindrical, spreading or sub-erect, the upper branches more frequently opposite; the ultimate ramuli mostly secund, erecto-patent, and not differing much in length, excessively slender, mostly of one, occasionally of two or three cells, apices obtuse; axils acute. Articulations somewhat irregular in length, but the upper not much shorter than the lower, three to five times longer than their diameter, cylindrical, the dissepiments slightly contracted. Substance very soft and flaccid, and adhering rather firmly to the paper in drying. Colour, when young, a rather bright green; when old, pale yellowish white, with a somewhat silky gloss.

A very fine soft silky looking species, and a very pretty object in its native pools, where its extremely soft and delicate filaments are singly imperceptible to the naked eye.

When young, the colour of the plant is of a very delicate but rather bright green, but when the plant becomes large the endochrome is so much diluted that the filaments are almost hyaline ; when such plants are dried they are almost white.

Its nearest allies are *C. flexuosa* and *C. refracta.* From the first it is chiefly separated by its more generally opposite branches, and its shorter ramuli ; the latter character seems to be its principal distinction from *C. glaucescens.* From *C. refracta* its much more erect branches and ramuli and rather longer joints will generally serve to distinguish it.

The filaments also are generally much more delicate, and the surface possesses more of a silky gloss than either *C. flexuosa* or *C. refracta.* This character, however, we fear, can hardly be depended on, as all these species present a very different appearance when old from what they did when young, both in colour, glossiness, and, we strongly suspect, in the rigidity and direction of the branches.

EXPLANATION OF PLATE CXCIV.

Fig. 1.—*Cladophora albida*, natural size.
2.—Portion of a filament.
3.—Joints. Both magnified.

Cladophora albida kütz.

Plate CXCV.

CLADOPHORA LANOSA.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *lanosa*.—Filaments very slender, short, slightly branched, forming small, pencil-like or spherical tufts on other Algæ; branches suberect, straight, mostly alternate; lower articulations one and a-half to twice, the upper five to six times as long as their diameter.

Cladophora *lanosa*.—*Kütz. Phyc. Gen.* p. 269; *Harv. P. B.* plate 6; *Harv. Man.* p. 204; *Harv. Syn.* p. 170; *Atlas*, plate 66, fig. 308; *Harv. N. B. A.* part 3, p. 76.

Conferva *lanosa*.—*Roth, Cat. Bot.* vol. iii. p. 291, t. 9; *E. Bot.* t. 2099; *Lyngb. Hyd. Dan.* p. 160, t. 56; *Dillw. Conf.* t. E.; *Ag. Syst. Alg.* p. 112; *Grev. Fl. Edin.* p. 316; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 358; *Harv. Man.* 1st edit. p. 138; *Wyatt, Alg. Danm.* No. 194.

Hab.—Generally on the larger *Fuci*, sometimes on rocks. Common.

Geogr. Dist.—Northern Atlantic shores of Europe; Baltic Sea.

Description.—Filaments very slender, and but very slightly branched, forming pencil-like or globular tufts on other Algæ, from a quarter of an inch to an inch and a-half in length; tufts very dense, but not entangled; matted with root-like processes arising from the stems and primary branches. Branches few, straight, cylindrical, and erect, scarcely tapering upwards, the apices obtuse, the axils very acute; mostly alternate, rarely opposite, four to six or eight times divided, all the branches uniform, generally without smaller ramuli. Articulations of the lower part one and a-half to twice, the upper four to five or occasionally six times as long as their diameter. Substance very soft, flaccid, and silky, adhering closely to paper in drying. Colour, when young, a fine bright green, and then easily preserved in drying; but when older it fades to a pale green, and in drying to a dirty white, occasionally with a slight silky gloss.

A beautiful little plant, and one of our most common species both on the east and west coasts, but on the latter very much more luxuriant and beautiful.

We have seldom seen specimens on the east coast exceed half an inch in height, often not more than a quarter, whereas specimens from the western shores are not unfrequently an inch or an inch and a-half in length, and frequently with more or less of a silky gloss, especially when the plants have nearly reached maturity; after that the colour as well as the gloss gradually disappears.

It often forms a very beautiful object in the pools in early summer, frequently covering to a greater or less extent every Alga in the pool, with its little tufts of a bright and peculiarly pleasant green.

It is, however, often very fastidious in the choice of its little domain, occupying every available point of attachment, where it once fixes its choice, but you may travel over a quarter of a mile of what may appear to you equally eligible sites before you find another pool so abundantly colonised.

EXPLANATION OF PLATE CXCV.

Fig. 1.—*Cladophora lanosa*, natural size.
2.—Filament.
3, 4.—Upper and lower joints. All magnified.

1

Cystophora lanosa. Kütz.

CLADOPHORA UNCIALIS.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *uncialis*.—Filaments short, sparingly divided; branches mostly simple, very slender, cylindrical, sometimes once or twice divided, much matted together near the base with short, tortuous root-like fibres, alternate or secund, more or less flexuous; articulations one and a-half to twice as long as broad.

Cladophora *uncialis*.—*Harv. P. B.* plate 207; *Harv. Man.* p. 204; *Harv. Syn.* p. 171; *Atlas*, plate 66, fig. 309; *Harv. N. B. A.* part 3, p. 77.

Spongiomorpha *uncialis*.—*Kütz. Phyc. Gen.* p. 273.

Conferva *uncialis*.—*Fl. Dan.* t. 771, fig. 1; *Lyngb. Hyd. Dan.* p. 160, t. 56; *Ag. Syst.* p. 111; *Harv.* in *Hook. Journ. Bot.* vol. i. p. 304; *Wyatt, Alg. Danm.* No. 146; *Harv. Man.* 1st edit. p. 138.

Hab.—On rocks near low-water mark. Annual. May and June. Not uncommon.

Geogr. Dist.—Shores of Northern Europe; Atlantic coasts of N. America.

Description.—Filaments very slender, somewhat rigid, one inch to an inch and a-half in length or more, forming dense, somewhat globular tufts, from one to two inches in diameter, mostly simple below, with numerous short, tortuous, root-like processes arising from the sides of the filaments, and twisting round and among the filaments, rendering them very much matted and entangled, sparingly branched upwards. Branches simple or once or twice divided, straight or flexuous, subpatent or erect, cylindrical, except the apical joints, which taper to an obtuse point. Articulations at first cylindrical, at length constricted at the dissepiments, once and a-half to twice as long as their diameter, of nearly uniform length throughout the whole plant. Substance rather rigid, and scarcely adhering to paper. Colour, a fine rather deep grass-green, permanent when dried before maturity, but fading in age, and, when then dried, often fading to a greenish white.

This very pretty little species is not unfrequent on all our rocky coasts, preferring exposed rocks at low-water mark, where it forms little globular tufts, scattered over the rocks, where it is constantly

exposed to the lash of the angry surge; consequently its term of life is rather of short duration, and as soon as it has reached its highest state of simple development, the same waves which nourished it on its rocky bed commence the task of its demolition, and it is soon, very soon, not only numbered with the dead, but with the things that were, and its minute spores mingle with the briny wave, or sink to the bottom and find protection and a long repose in the cracks and crannies of the rocks around.

This has much resemblance to *C. arcta* in miniature, with which its tufts sometimes grow intermingled; more frequently, however, it is associated with *Conferva bangioides* or *Youngana;* from the first two its small size readily distinguishes it, and from the last, its branched filaments. With the first species and *C. lanosa* it forms a little group, which some have considered worthy of generic distinction, distinguished only by their radiculose stems, a character too unimportant, perhaps, to constitute them as a genus, yet, when we have already divided the old genus *Conferva* into two parts by means of their simple or branching filaments, there can be no very serious objection possibly to our going a step further, and making another subdivision, were it to serve any practical purpose. In a *Phycologia Universalis* such might be desirable, but in describing the British species, their number is too limited to render any such subdivision desirable.

CLADOPHORA UNCIALIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Tuft of *Cladophora uncialis*, natural size.
2.—Filament.
3.—Articulations. Both magnified.

Plate CXCVI.

CLADOPHORA ARCTA.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *arcta*.—Filaments very fine, much branched, and matted together with radicles near the base; branches straight, and but slightly entangled upwards, very erect, alternate, opposite, or secund, upper ones appressed, tapering at the apex to a rather obtuse point; articulations becoming longer upwards, at the base rather more than once as long as broad.

Cladophora *arcta*.—*Kütz. Phyc. Gen.* p. 263; *Harv. P. B.* plate 135; *Harv. Man.* p. 204; *Harv. Syn.* p. 171; *Atlas*, plate 66, fig. 310; *Harv. N. B. A.* part 3, p. 75.

Cladophora *vaucheriæformis*.—*Kütz.* l. c. p. 263.

Cladophora *centralis*.—*Kütz.* l. c. p. 269.

Conferva *arcta*.—*Dillw. Conf.* Suppl. p. 67, t. E.; *E. Bot.* t. 2098; *Lyngb. Hyd. Dan.* p. 157; *Ag. Syst.* p. 118; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 359; *Harv.* in *Mack. Fl. Hib.* part 3, p. 230; *Harv. Man.* 1st edit. p. 139.

Conferva *centralis*.—*Lyngb. Hyd. Dan.* p. 161, t. 56; *Ag. Syst.* p. 111; *Fl. Dan.* t. 1777; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 358.

Conferva *vaucheriæformis*.—*Ag. Syst.* p. 118.

Hab.—On rocks and stones, from half-tide level to low-water mark. Perennial. Spring till autumn. Common.

Geogr. Dist.—Common on the Atlantic shores of Europe and North America; Baltic Sea; Falkland Islands (*Dr. Hooker*).

Description.—Filaments very slender; when young forming fine, soft, silky, pencil-like tufts, one and a-half or two inches in length, free, or but slightly entangled, spreading in star-like manner from the point of attachment; when older, becoming much branched, the stems and lower branches much matted and entangled by means of small root-like bodies which are given out from them in all directions, and by which they become inextricably matted and bound together into little bundles; the upper parts matted and twisted together

also by means of the branches: these are long, very erect, alternate, at length often opposite or secund, cylindrical to the apex of the last articulation, or occasionally having the last two or three joints tapering to an obtuse point. Articulations towards the base one or one and a-half times the diameter, becoming longer upwards, where they are six to eight times the diameter. Substance, when young, very soft and silky, adhering closely to paper. Colour, a beautifully rich, delicate yellowish green; when old, the filaments become much more rigid, scarcely adhering to paper, and the colour is either a deep, dark green or a brownish green, with a tint of olive, and in that state it adheres but imperfectly to paper.

A beautiful species when well grown, either in youth or in age, but scarcely anything could be considered more different than the one state is from the other. In the young state it is extremely delicate and flaccid, of a fine delicate yellowish green colour, the filaments exceedingly fine, somewhat rigid, straight, and but slightly branched, all of unequal length, and when a tuft is lifted from the water, all cohering together and tapering to a narrow point, or when spread upon paper separating freely and forming a broad pencil, of which all the filaments are very unequal, and when dried it retains its colour, and has a fine silky gloss. Of this state the upper figure in *Phyc. Brit.* is beautifully characteristic, except the colour, which is rather dark.

As the plants advance to maturity, however, the habit as well as the colour is entirely changed. The latter becomes greatly intensified, and is generally of deep dark green when they reach maturity, but after that the colour generally fades to a greenish olive, very soft, and without gloss, or into a harsh, earthy dark green, equally dull. At the same time the habit of the upper branches undergoes an equally remarkable change. The delicate, *free*, pencil-like extremities of the filaments become excessively branched and tufted, the branches nearly all of one length, presenting almost a level top, so that when lifted from the water the middle of the tuft becomes constricted, and the top spreads out, and is broad and bushy, and when spread on paper, it is with difficulty separated into a broad pencil, somewhat resembling the brushes which painters use for varnishing. This condition of the plant is admirably represented in the lower figure of the plate in *Phyc. Brit.*

When old, the lower part of the tuft is inextricably interwoven into a dense, spongy mass, by means of the numerous radicles that proceed from the stems in every direction. The origin of these radicles is quite peculiar. The branches of all the articulated Algæ arise either close under or from the summit of the articulation, whereas these radicles arise not from the dissepiment or its vicinity, but from the middle of the

joint, and as the radicle is generally not above one-fourth or one-fifth the diameter of the branch from which it springs, the mode of its origin is very apparent. They are generally very slender and simple, but sometimes they assume a more robust character, and become more or less branched with always longer joints than the branch to which it is attached.

EXPLANATION OF PLATE CXCVI.

Fig. 1.—*Cladophora arcta*, natural size.
2.—Base of a filament with rootlets.
3.—Apex of filament.
4.—Joints. All magnified.

Cladophora flexa.

Nature Printed by Henry Bradbury.

Plate CXCVII.

CLADOPHORA GLAUCESCENS.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion. Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *glaucescens*.—Filaments densely tufted, very slender and cylindrical, of a glaucous green, much branched; branches somewhat flexuous, upper straight, suberect, ultimate ones straight, elongate, and secund; articulations two to three times as long as their diameter.

Cladophora *glaucescens*.—*Harv. P. B.* plate 196; *Harv. Man.* p. 205; *Harv. Syn.* p. 172; *Atlas*, plate 66, fig. 311; *Harv. N. B. A.* part 3, p. 77.

Conferva *glaucescens*.—*Griff.* in *Wyatt, Alg. Danm.* No. 195; *Harv. Man.* 1st edit. p. 139.

Hab.—On rocks, stones, &c., between tide-marks. Annual. Summer. Not uncommon.

Geogr. Dist.—British Islands; Atlantic coasts of North America.

Description.—Root, "a small callus." Filaments densely tufted, very slender and cylindrical, two to six inches long, very much branched, and, especially when old, greatly entangled. Branches straighter upwards, and mostly alternate or scattered, scarcely tapering, erecto-patent, with very acute axils, the principal ones somewhat flexuous and zigzag. The ultimate ramuli secund, long, slender, and tapering to an obtuse point. Articulations cylindrical in the older parts of the plants; in the younger, having the dissepiments slightly contracted, two and a-half to three and a-half times as long as their diameter. Substance rather rigid, and very imperfectly adhering to paper. Colour, a rather pale, pleasant green, paler in age, and then becoming still paler in drying: when young, however, the colour is much brighter, and, when dried in that state, it keeps its colour, and has a slight gloss, but, like most other species possibly, when dried after maturity it is without gloss, and gradually fades.

A beautiful species, and possibly a good one, although closely allied to *C. albida*, and chiefly distinguished from it by the somewhat shorter articulations, more uniform throughout the plant, the more regularly alternate branching, and shorter ramuli, and the peculiarly glaucous

colour, which is said to be more evident before the plants are removed from the water.

It seems to be by no means an uncommon species, and, when well grown, is one of the handsomest, but is very variable in its habit, from the various exposure to deep or shallow water, and to sun and shade, to which it is subject. It is generally in perfection in early summer, and very soon becomes metamorphosed by parasites or entirely disappears.

EXPLANATION OF PLATE CXCVII.

Fig. 1.—*Cladophora glaucescens*, natural size.
2.—Portion of a filament.
3.—Joints. Both magnified.

Cladophora glancescens. Griff.

Nature Printed by Henry Bradbury

CLADOPHORA FALCATA.—*Harv.*

GEN. CHAR.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoopores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

CLADOPHORA *falcata*.—"Densely tufted, dark green filaments, intricate at the base, ultra capillary, rigid, much curved, irregularly branched; branches zigzag, repeatedly divided, the lesser divisions arched or strongly incurved and falcate, furnished along their inner faces with secund, blunt ramuli; articulations three or four times longer than broad, with a dense endochrome, and pellucid dissepiments."—*Phyc. Brit.*

CLADOPHORA *falcata*.—*Harv. P. B.* plate 216; *Harv. Man.* p. 205; *Harv. Syn.* p. 172; *Atlas*, plate 69, fig. 325.

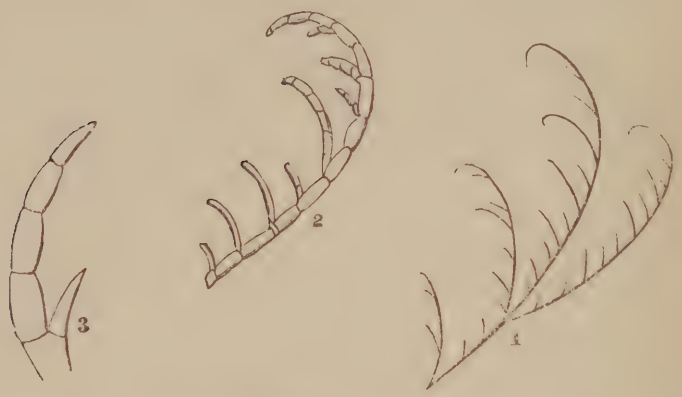
HAB.—The bottom of clear rock-pools, near low-water mark. Annual. Summer. Rocks outside Dingle Harbour, Kerry (*Dr. Harvey*) 1845; Jersey (*Miss White*).

GEOGR. DIST.—British Islands (?)

DESCRIPTION.—"Filaments densely tufted, somewhat interwoven and entangled at the base, three or four inches high, thicker than human hair, nearly of equal diameter throughout, much branched, and repeatedly divided. Branches curved and twisted or curled in various directions, irregularly divided; the lesser branches sometimes alternate, sometimes secund, and sometimes two or three springing from the same point, all very erect, arched or strongly hooked inwards, furnished on their concave side with numerous secund ramuli of unequal length, long and short occurring alternately, the shorter ramuli simple, formed of one or two cells, the longer bearing a second series on their inner faces, and hooked like the branches. The aspect of the whole tuft is peculiarly crisp and squarrose. Articulations tolerably uniform, three or four times as long as broad, with hyaline borders and dissepiments, and containing a dense endochrome, which partially recovers its form after having been dried. Colour, a rich, glossy, full green. Substance rigid and crisp, adhering to paper in drying."—*Phyc. Brit.*

We have seen no specimens of this, or at least none sufficiently characteristic to be confidently referred to it, although we have often met with specimens more or less falcate in their upper part. Judging from

the beautiful figure in *Phycologia Britannica*, a part of which we have copied, it would appear to be a handsome species, and the characters, if constant, well marked; we hope it will prove a good one.



CLADOPHORA FALCATA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Portion of a filament.
2.—Same.
3.—Apex of same. All more or less magnified.

CLADOPHORA MAGDALENÆ.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *Magdalenæ*.—"Filaments capillary, blackish green, short, decumbent (?), matted together, slightly branched, irregularly bent; branches patent or divaricate, curved, dichotomous or secund, with wide axils; ramuli few, spreading, falcate, as thin as the cells from which they spring; articulations three or four times as long as broad, filled with very dense, opaque endochrome; dissepiments very narrow, not contracted."—*Phyc. Brit.*

Cladophora *Magdalenæ*.—*Harv. P. B.* plate 355 a.; *Harv. Syn.* p. 173; *Atlas*, plate 67, fig. 312.

Hab.—Jersey (*Miss Turner*).

Geogr. Dist. ——?

Description.—"Filaments, in the only specimen examined, about an inch long, matted together, but not tufted, apparently growing either prostrate or entangled among the bases of other Algæ, not much branched. Branches irregularly dichotomous or angularly alternate, spreading, with wide angles, often divaricate, curved, simple, or once or twice divided; naked or furnished with a few secund, falcate ramuli. Articulations thrice or four times as long as broad, those of the ramuli the shortest, filled with a very dense, dark green minutely granulated endochrome, resembling that of *C. rupestris;* the dissepiments very narrow, and scarcely at all contracted; the apices obtuse. Substance somewhat rigid, not adhering to paper in drying. Colour, a dark, dingy green."—*Phyc. Brit.*

Of this curious little plant we know nothing beyond what is given in *Phycologia Britannica*, the author of which seems to consider it as possibly related to *C. rupestris* or perhaps to *C. fracta*, from both of which, however, it seems to differ considerably, both in size, habit, and character.

In a difficult genus such as the present, it is often no easy matter to refer specimens to their proper species, even when in possession of all the

particulars of their habit and characters, and still more so with a fragment such as the above, without the certainty as to whether it was a complete specimen, or merely a fragment possessing only a few of the characters of the original specimen.

CLADOPHORA MAGDALENÆ.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Tuft of *Cladophora Magdalenæ*, natural size.
2.—Filament.
3.—Joints. Both magnified.

CLADOPHORA GATTYÆ.—*Harv.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *Gattyæ*.—"Filaments an inch long, dingy green, capillary, matted together in dense tufts, not much branched, dichotomously divided, flexuous, with few ramuli; articulations in all parts of the frond nearly uniform, about once and a-half as long as broad, filled with endochrome; the dissepiments very narrow and contracted."—*Phyc. Brit.*

Cladophora *Gattyæ*.—*Harv. P. B.* plate 355 B.; *Harv. Syn.* p. 173; *Atlas*, plate 67, fig. 313.

Hab.—Locality uncertain.

Geogr. Dist.——?

Description.—"Filaments about an inch long, as thick as human hair or somewhat thicker, matted together in dense, ropy tufts, irregularly branched, somewhat dichotomous, the angles rounded, ramuli few and patent. Articulations very uniform, about once and a-half as long as broad, filled with olivaceous (?) or dull green endochrome, and separated by exceedingly narrow dissepiments. Apices on my specimen often broken. Substance membranaceous, adhering to paper."—*Phyc. Brit.*

This is professedly given in *Phyc. Brit.* as "a puzzle, figured with the hope that it may lead to more certain information. The external habit is between that of *C. uncialis* and *Ectocarpus littoralis*, but the threads are very much more robust than in the former, and differently branched from the latter, as well as more robust." A very obscure species—so obscure, indeed, that it is even doubtful if it be a *Chlorosperm* at all, from the colour of the endochrome.

CLADOPHORA GATTYÆ.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Tuft of *Cladophora Gattyæ*, natural size.
2.—Filament.
3.—Joints. Both magnified.

CLADOPHORA FLAVESCENS.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *flavescens.*—Filaments very slender, distantly branched, forming widely spread floating strata of indefinite extent; branches mostly alternate, sometimes dichotomous, sub-patent; ultimate ramuli secund or forked; articulations eight to ten times as long as the diameter.

Cladophora *flavescens.*—*Kütz. Phyc. Gen.* p. 267; *Harv. P. B.* plate 298; *Harv. Man.* p. 206; *Harv. Syn.* p. 173; *Atlas*, plate 67, fig. 314; *Kütz. Sp. Alg.* p. 402.

Conferva *flavescens.*—*Roth, Cat. Bot.* vol. ii. p. 224; vol. iii. p. 241; *Fl. Germ.* vol. iii. pars. 1, p. 511; *Dillw. Conf.* p. 64, t. E.; *E. Bot.* t. 2088; *Ag. Syst.* p. 112.

Hab.—In ditches of brackish or fresh water. Annual. Summer. Common.

Geogr. Dist.—Europe (?)

Description.—Filaments very fine, forming widely spreading, entangled, floating strata, sometimes of great extent, and frequently rolled into large masses by the wind and waves. Branches irregular and rather distant, mostly alternate, sometimes dichotomous or alternate, very slender and cylindrical, flexuose, patent or erecto-patent. The axils wide but acute, occasionally with short or imperfectly-developed ramuli, intermixed; upper ramuli few, very slender, and mostly secund, of from one to three joints; upper one slightly tapering to an obtuse round point. Articulations cylindrical, six to eight or ten times longer than their diameter, the dissepiments not contracted. Substance rather flaccid and membranaceous, not adhering to paper in drying. Colour, a pale yellowish green, very transparent, much faded, and without gloss when dry, "becoming yellower in age, and at last almost golden."—*Phyc. Brit.*

This is not only one of our most common, but one of our most abundant species, frequently filling or rather covering pools of considerable extent, with its silky carpeting, here and there collected into dense

masses, or, if the pool be exposed to the wind or under the influence of the tide, rolled along the shore in irregular rope-like masses, sometimes for many yards, or, with occasional interruption, even miles in extent.

The colour is generally of a fine transparent greenish yellow, but not unfrequently patches are observed of a much greener tint, and in the young state the colour is generally brighter.

It is not a very distant relative of *C. fracta*, with which it is often associated in the same pool, and with which it not unfrequently becomes intermixed, causing considerable confusion and uncertainty in identification. The pale yellow-green colour, and extreme length of the articulations, which are scarcely constricted at the dissepiments, chiefly distinguish it from the following.

In large estuaries, where there are extensive marshes, occasionally overflowed by the sea, it may be sometimes collected in cartloads, and occasionally is so, along with other Algæ, for the purpose of manure.

CLADOPHORA FLAVESCENS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Filaments, natural size.
2.—Portion of same.
3.—Joints. Both magnified.

CLADOPHORA FRACTA.—*Kütz.*

Gen. Char.—Frond filiform, attached, green, branched; filaments articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, having at some period a proper ciliary motion." Name from κλάδος, "a branch," and φορέω, "I bear;" alluding to the branched frond, in contradistinction to that of *Conferva*.

Cladophora *fracta*.—Filaments free or attached, extremely slender and capillaceous, distantly branched. Branches dichotomous or frequently alternate, rather patent and flexuous, the ultimate ones secund, erecto-patent, axils wide but acute. Articulations two to four times as long as their diameter, or occasionally longer; at first nearly cylindrical, at length elliptical or obovate, with the dissepiments greatly contracted.

Cladophora *fracta*.—*Kütz. Phyc. Gen.* p. 263; *Kütz. Sp. Alg.* p. 410; *Harv. P. B.* plate 294; *Harv. Man.* p. 206; *Harv. Syn.* p. 174; *Atlas*, plate 67, fig. 315; *Harv. N. B. A.* part 3, p. 83.

Conferva *fracta*.—*Fl. Dan.* t. 946; *Dillw. Conf.* t. 14; *E. Bot.* t. 2338; *Web. et Mohr, Gr. Conf.* t. 14; *Roth, Cat. Bot.* vol. iii. p. 230; *Ag. Disp.* p. 31; *Ag. Syst.* p. 109; *Lyngb. Hyd. Dan.* p. 152, t. 52; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 356; *Harv. Man.* 1st edit. p. 134; *Harv.* in *Mack. Fl. Hib.* part 3, p. 227.

Conferva *divaricata*.—*Roth, Cat. Bot.* vol. i. p. 179.

Conferva *vagabunda*.—*Huds. Fl. Angl.* vol. ii. p. 601; *Lightf. Fl. Scot.* vol. ii. p. 990; *Dillen. Hist. Musc.* t. 5, f. 32.

Conferva *hirta*.—*Fl. Dan.* t. 947.

Conferva *flavescens*.—*Wyatt, Alg. Danm.* No. 224 (not of *Roth*).

Hab.—In ditches of brackish water, communicating with the tide; also in fresh water lakes, ditches, and streams. Very common.

Geogr. Dist.—Abundant throughout Europe.

Description.—Filaments attached, forming dense tufts, six to twelve inches or more in length, or free, forming widely spreading strata composed of many confluent bundles, which become inextricably intermixed and interwoven, so as often to appear one mass, with here and there globular masses interspersed; filaments often of great length, extremely delicate, cylindrical, irregularly branched. Branches flexuose, mostly dichotomous, occasionally alternate or secund, rather patent, with wide but acute axils; the ultimate ramuli mostly secund, rather short, erecto-patent, mostly fan-cylindrical, the upper one or two joints taper to an obtuse point. Articulations cylindrical, three to four times their

diameter, or sometimes rather longer, at length greatly contracted at the dissepiments, elliptical or obovate. Substance, when young, rather flaccid and more or less adherent; when older more crisp and rigid, and very imperfectly adhering to paper. Colour, a bright and pleasant green; when mature, deep, dark, and with the endochrome much more granular.

A very common species everywhere, both in fresh and in brackish water, occasionally attached, but more frequently forming extensive floating strata on ponds, ditches, and pools, and covering the surface, sometimes in a thick mass, and occasionally in thin fleeces, closely interwoven and matted together, and after storms rolled into dense, rope-like masses along the shores.

These masses may be rolled and unrolled like a web of cotton wool, and being inextricably interwoven, possess considerable tenacity when dried. Such a fleece was brought to us one day by a young draper, who carried it over his arm like a scarf (which it very much resembled), and wished to know its name. On placing a fragment under the microscope, I soon recognised an old acquaintance. The specimen, when dried, was several yards in length, nearly a yard in breadth, and of nearly uniform *texture*. It grew on a pond attached to a flour-mill, the waste water from the engine keeping the water always tepid. The Alga completely covered the surface in a uniform fleece.

CLADOPHORA FRACTA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Filaments, natural size.
2.—Portion of same, magnified.
3.—Portion of same, greatly magnified.

RHIZOCLONIUM RIPARIUM.—*Kütz.*

Gen. Char.—Filaments green, articulated, cylindrical, geniculated; emitting here and there short root-like processes. Fructification: "Granules contained in the cells." Name from ῥιζόω, "I root," and κλὼν, "a branch."

Rhizoclonium *riparium*.—Filaments very slender, decumbent, forming thin flacculent strata, loosely entangled, here and there slightly geniculated, emitting at the angles short root-like processes, "which occasionally elongate into branches, and often attach themselves to neighbouring filaments."

Rhizoclonium *riparium*.—*Harv. P. B.* plate 238; *Harv. Man.* p. 206; *Harv. Syn.* p. 175; *Atlas*, plate 68, fig. 318; *Harv. N. B. A.* part 3, p. 92.

Rhizoclonium *obtusangulum*.—*Kütz. Phyc. Gen.* p. 261.

Conferva *riparia*.—*Roth, Cat. Bot.* vol. iii. p. 216; *E. Bot.* t. 2100; *Dillw. Conf.* p. 111, Suppl. t. E.; *Ag. Syst.* p. 106; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 359; *Harv.* in *Mack. Fl. Hib.* part 3, p. 230; *Harv. Man.* 1st edit. p. 140.

Conferva *obtusangula*.—*Lyngb. Hyd. Dan.* p. 159, t. 55.

Conferva *perreptans*.—*Carm. Harv.* in *Hook. Br. Fl.* vol. ii. p. 352.

Conferva *tortuosa*.—*Wyatt, Alg. Danm.* No. 190 (not of *Dillw.*).

Zygnema *littoreum*.—*Lyngb. Hyd. Dan.* t. 59.

Hab.—On sand-covered rocks, near high water. Annual. Summer. Not uncommon.

Geogr. Dist.—Shores of Northern Europe.

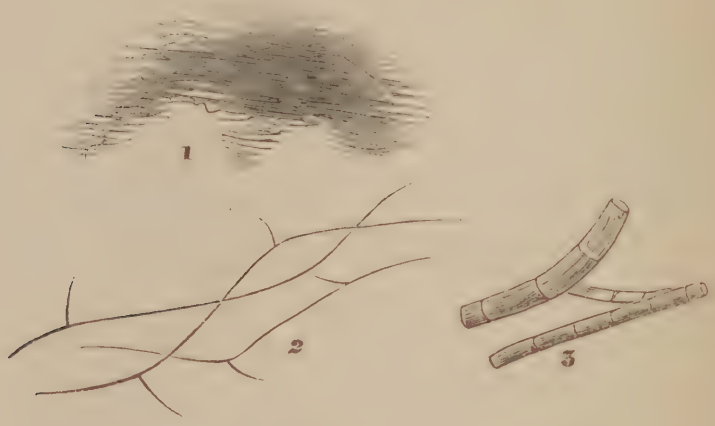
Description.—Filaments extremely slender and loosely entangled into thin light strata, sometimes of considerable extent, simple cylindrical, but here and there geniculated or angularly bent into very obtuse angles, from which spring short root-like processes, mostly tapering to a point, and spine-like, "rarely becoming elongated into branches." More generally they are short, however, of from three to five articulations, and slightly curved, often attaching themselves to the nearest filaments, thus binding the stratum more inextricably together. Articulations cylindrical, not constricted at the dissepiments, two to three times as long as their diameter. Substance flaccid and closely adhering to paper in drying. Colour, a pale yellowish green, well preserved in drying.

This curious production appears to be not uncommon, although frequently occurring in small quantity and oftener overlooked on account

of its generally inconspicuous appearance, and unobtrusive habit. We first became acquainted with it in the marine aquarium, which it repeatedly filled with a beautiful thin silky stratum of a bright grass-green colour, the filaments being so fine as to be quite imperceptible to the eye except in the mass. We have repeatedly met with it since in shallow pools near high-water mark ; but its peculiar characters were never so well developed as in the aquarium.

It is not however confined to the sea-shore, as we have met with it, or an allied species, under the drip of fresh water, and mixed with *Oscillatoria nigra* and other Confervæ.

These, however, as well as some other forms, may prove distinct species, as they differ somewhat from the normal form.



RHIZOCLONIUM RIPARIUM.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Filament, natural size.
2.—Same, magnified.
3.—Portion of same, greatly magnified.

RHIZOCLONIUM CASPARYI.—*Harv.*

Gen. Char.—Filaments green, articulated, cylindrical, geniculated; emitting here and there short root-like processes. Fructification: "Granules contained in the cells." Name from ῥιζόω, "I root," and κλὼν, "a branch."

Rhizoclonium *Casparyi*.—"Filaments elongated, extremely slender, decumbent, pale yellow-green, stratified, interwoven, curved, and here and there angularly bent at the angles, emitting short root-like branches which sometimes lengthen, and are filled with endochrome. Articulations two to six times longer than broad, with narrow dissepiments and granular endochrome."—*Phyc. Brit.*

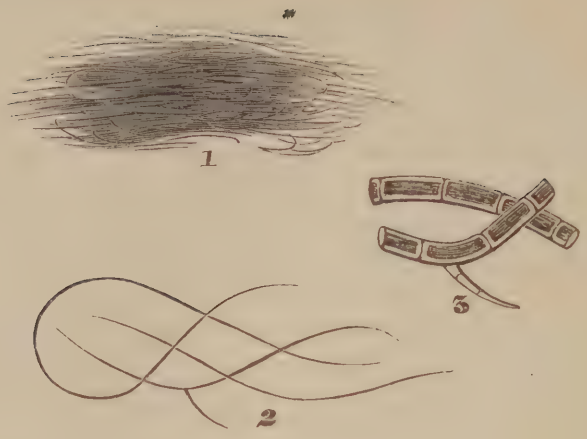
Rhizoclonium *Casparyi*.—*Harv. P. B.* plate 238 B.; *Harv. Syn.* p. 175; *Atlas* plate 68, fig. 318.

Hab.—At Falmouth and Penzance (*Dr. Robert Caspary*).

Geogr. Dist.—— ?

Description.—"Forming a thin web of a bright green colour and considerable extent. Filaments elongate, more slender than those of *R. riparium*, gracefully curved rather than twisted, interwoven, here and there angularly bent; at the angle issues a root-like process, which sometimes consists but of a few empty cells, at other times lengthens out into a branch. Cells in the same fleece very various, and even in the same filament at different ages; the full grown cell seems to be fully six times as long as its diameter; but short cells once and a half to twice as long as broad, which seem to be cells in process of development, are commonly mixed with the long cells. All contain a granular endochrome, the grains of very unequal size."—*Phyc. Brit.*

Of this species we know nothing except what we can glean from the above account and the figure accompanying; it is perhaps too nearly allied to the preceding, but so little is yet known of these obscure forms that we are unable clearly to define the limits of species.



RHIZOCLONIUM CASPARYI.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Filament, natural size.
2.—Same, magnified.
3.—Portion of same, greatly magnified.

CONFERVA ARENICOLA.—*Berk.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *arenicola*.—"Threads soft, simple, extremely fine, matted, somewhat crisped, at first uniform pale green, at length distinctly jointed; articulations once and a-half as long as broad, dotted; interstices pellucid."—*Berk.* in *Phyc. Brit.*

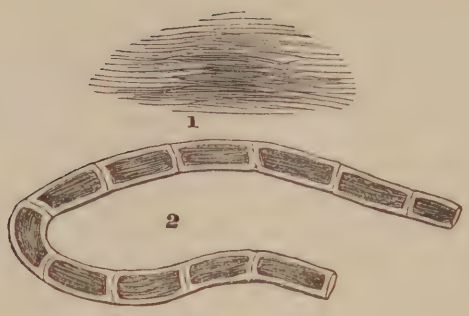
Conferva *arenicola*.—*Berk. Gl. Br. Alg.* p. 36, t. 13, fig. 3; *Harv. P. B.* plate 354 A.; *Harv. Man.* p. 207; *Harv. Syn.* p. 175; *Atlas*, plate 67, fig. 317.

Hab.—Salt marshes, within reach of the tide (*Rev. M. J. Berkeley*).

Geogr. Dist.—— ?

Description.—"Creeping on the sandy margins of pools in a salt marsh periodically flooded, forming a thin, soft, delicate, crisped web, of a pale yellow green. Threads extremely slender, flexuous, at first coloured, with a few scattered dots, then with manifest dissepiments, and finally the granules contract and form a distinctly-defined mass of a darker green in the centre, with pellucid interstices. Articulations once and a-half as long as broad: when dry the articulations are alternately contracted."—*Berk.* l. c. in *Phyc. Brit.*

A rather puzzling form in this genus, which, however, is still too imperfectly known to be considered well defined.



CONFERVA ARENICOLA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—Filament, natural size.
2.—Portion of same, magnified.
(Reduced from *Phyc. Brit.*)

CONFERVA TORTUOSA.—*Dillw.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *tortuosa*.—Filaments rather rigid, much curled, twisted and entangled; articulations from two to three times as long as their diameter.

Conferva *tortuosa*.—*Dillw. Conf.* t. 46; *E. Bot.* t. 2220; *Lyngb. Hyd. Dan.* p. 145, t. 49; *Grev. Fl. Edin.* p. 315; *Ag. Syst.* p. 98; *J. Ag. Alg. Medit.* p. 12; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 352; *Harv.* in *Mack. Fl. Hib.* part 3, p. 225; *Harv. P. B.* plate 54 A.; *Harv. Man.* p. 208; *Harv. Syn.* p. 177; *Atlas*, plate 68, fig. 319.

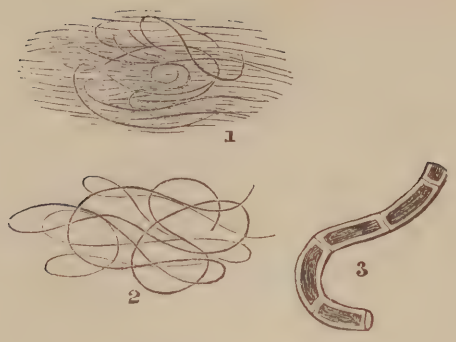
Chætomorpha *tortuosa*.—*Harv. N. B. A.* part 3, p. 88.

Hab.—On submarine rocks at half-tide level; also in rock-pools. Not uncommon.

Geogr. Dist.—Shores of Europe; Faroe Isles; Mediterranean Sea.

Description.—Filaments free, floating, rather rigid, forming continuous, sometimes extensive, much interwoven strata; the separate filaments being elastic, much curled and twisted. The articulations cylindrical, not constricted at the dissepiments, from two to two and a-half or three times as long as their diameter. Colour, a rather deep green.

A common inhabitant of shallow tide-pools, generally twisted and entangled among other Algæ, and readily distinguished by its rigid, somewhat elastic, much curled filaments. It sometimes forms extensive strata, but more frequently occurs in small quantity, mixed with other filiform Algæ, or twisted round the roots and stems of Fuci, &c.



CONFERVA TORTUOSA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Filament, natural size.
2. —Same, magnified.
3.—Portion of same, greatly magnified.

CONFERVA IMPLEXA.—*Dillw.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *implexa*.—Filaments very slender and flaccid, much twisted and entangled into extensive strata; articulations cylindrical, scarcely longer than their diameter, sometimes slightly contracted at the dissepiments.

Conferva *implexa*.—*Dillw.* Suppl. t. B; *E. Bot.* t. 2309; *Lyngb. Hyd. Dan.* p. 144, t. 49; *Ag. Syst.* p. 91; *Wyatt, Alg. Danm.* No. 142; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 352; *Harv.* in *Mack. Fl. Hib.* part 3, p. 226; *Harv. P. B.* plate 54 B; *Harv. Man.* p. 209; *Harv. Syn.* p. 177; *Atlas*, plate 68, fig. 320.

Conferva *ulothrix*.—*Lyngb. Hyd. Dan.* p. 146, t. 50; *Harv.* l. c. p. 353; *Harv. Man.* 1st edit. p. 129.

Conferva *intricata*.—*Grev. Fl. Edin.* p. 315.

Bangia *Johnstoni*.—*Grev.* in *Johnston's Fl. Berw.* p. 260.

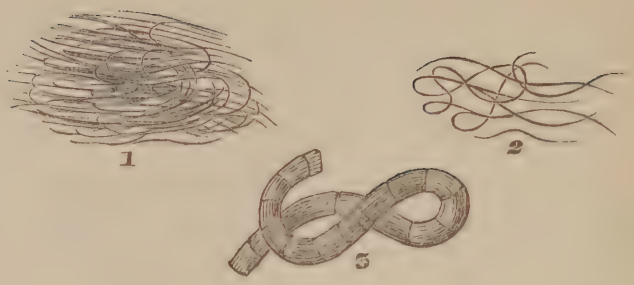
Bangia *viridis*.—*Fl. Dan.* t. 1601, f. 1 (sec. *Lyngb.*).

Hab.—On marine rocks, and in pools on other Algæ. Not uncommon.

Geogr. Dist.—European shores; Faroe Isles.

Description.—Filaments very slender and flaccid, free, continuous, and floating, often densely interwoven into more or less extensive strata, or twisted in smaller portions among the roots and stems of other Algæ. Articulations cylindrical, sometimes at length slightly contracted at the dissepiments, about as long or a little shorter or longer than their diameter. Colour, a fine deep green, not changing in drying.

A very distinct species, readily distinguished from the last by its more slender, less rigid filaments, and by the short articulations; generally also of a deeper green colour. It is scarcely less common than the last species, and frequents similar situations, namely, the shallow, weedy pools between tides, often associated with the last, or even mixed up with it.



CONFERVA IMPLEXA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Filaments, natural size.
2.—Portion of same, magnified.
3.—Portion of same, greatly magnified.

CONFERVA ARENOSA.—*Carm.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *arenosa.*—"Filaments slender, straightish, rigid, forming broad strata; articulations from three to five times longer than broad."

Conferva *arenosa.*—*Carm. Alg. Appin. ined.*; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 353; *Harv.* in *Mack. Fl. Hib.* part 3, p. 226; *Harv. P. B.* plate 54 c; *Harv. Man.* p. 207; *Harv. Syn.* p. 175; *Atlas*, plate 68, fig. 321.

Hab.—On the sandy sea-shore at half-tide level; Appin (*Capt. Carmichael*); Bantry Bay (*Miss Ball*).

Geogr. Dist.—Scotland? Ireland?

Description.—"This species occurs in fleeces a yard or more in extent, and of a peculiar structure. They consist of several exceedingly thin layers placed over each other, but so slightly connected that they may be separated like folds of gauze, to the extent of many inches without the least laceration. Filaments five to six inches long, about the thickness of *C. bombycina*, rigid, possessed of a peculiar roughness, feeling, when pulled asunder, as if a hair were drawn over a piece of resin. Articulations three to five times as long as broad; sporular mass assuming a great variety of forms. When old the filaments become exceedingly rough, and often tubercular." —*Carm. MSS.* in *Hook. Brit. Fl.*

This species we have not seen. Its principal distinction seems to be its long joints and pale yellow colour. It is, perhaps, not uncommon, but these obscure plants have hitherto attracted so little attention, and their characters are so imperfectly understood, that their distribution may be said to be all but unknown, and we may readily assume their occurrence in many localities where they have not yet been observed.

CONFERVA ARENOSA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—Filaments, natural size.
2.—Same, magnified.
(Reduced from *Phyc. Brit.*)

CONFERVA LITOREA.—*Harv.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *litorea.*—Filaments rather thick and rigid, free, procumbent or floating, forming continuous strata, generally of considerable extent; articulations one and a-half times as long as their diameter, here and there swollen at the dissepiments.

Conferva *litorea.*—*Harv. P. B.* plate 333; *Harv. Man.* p. 208; *Harv. Syn.* p. 176; *Atlas*, plate 68, fig. 322.

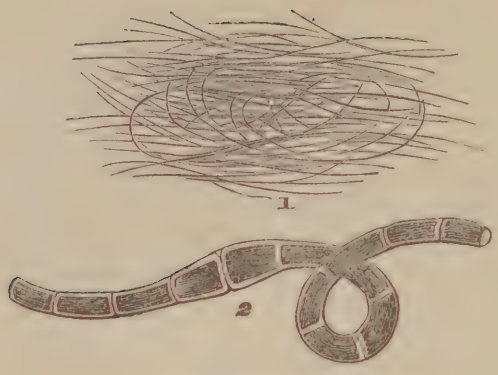
Conferva *linum.*—*Harv.* in *Hook. Br. Fl.* vol. ii. p. 352; *Harv. Man.* 1st edit. p. 128; *Wyatt, Alg. Danm.* No. 220 (not of *Roth*).

Hab.—In salt-water ditches near the coast, in estuaries, and along the muddy sea-shore, between tide-marks. Annual. Summer. Not uncommon.

Geogr. Dist. —— ?

Description.—Filaments rigid, continuous, very slender, forming dense floating strata or thin fleeces spreading over the muddy shore. "Each filament is irregularly curled, twisted, and sometimes angularly bent." Articulations quite cylindrical, not constricted at the dissepiments, but at irregular distances, two contiguous cells become swollen at their adjacent ends, and here the endochrome becomes greatly condensed, and of a much deeper colour; the cells, however, do not appear to combine, the dissepiment remaining pellucid as before, only being slightly constricted. Substance membranous, rather rigid, scarcely adhering to paper. Colour, a fine rather bright but deep green, not changing in drying.

The swollen and deep coloured cells are a very striking peculiarity in the present species, but whether this constitutes any peculiarity in the fructification, or merely a monstrosity in the structure of the cell, our knowledge of the history of the species seems too limited to enable us to determine.



CONFERVA LITOREA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—Filaments, natural size.
2.—Filament, greatly magnified.

CONFERVA LINUM.—*Roth.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *linum.*—Filaments stout and rigid, continuous and free, forming extensive, entangled strata; articulations as long as their diameter.

Conferva *linum.*—*Roth, Cat. Bot.* vol. i. p. 174, and vol. iii. p. 257; *Fl. Dan.* p. 771, f. 2; *E. Bot.* t. 2363; *Ag. Syst.* p. 97; *Jurg.!* vol. iii. No. 10; *Lyngb. Hyd. Dan.* p. 147, t. 50; *Kütz. Phyc. Gen.* p. 260 (not of *Hook. Br. Fl.* or *Harv. Man.*); *Harv. P. B.* plate 150 A; *Harv. Man.* p. 208; *Harv. Syn.* p. 176; *Atlas*, plate 68, fig. 323.

Conferva *capillaris.*—*Huds. Fl. Angl.* p. 598; *Lightf. Fl. Scot.* p. 988; *Dillw. Conf.* t. 9.

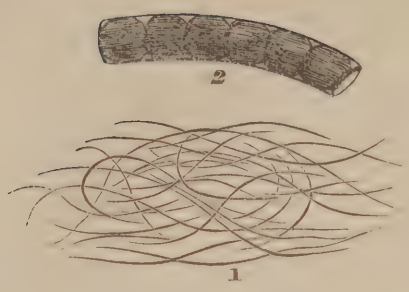
Conferva *crassa.*—*Ag. Syst.* p. 99; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 352; *Harv.* in *Mack. Fl. Hib.* vol. iii. p. 225; *Harv. Man.* 1st edit. p. 129; *Kütz. Phyc. Gen.* p. 260.

Hab.—In salt-water ditches, near the coast. Common.

Geogr. Dist.—Shores of Europe.

Description.—Strata floating, often extensive, loosely entangled, of a harsh, rigid feel. Filaments stout, rigid, and curled, continuous, rather brittle. Articulations about as long as their diameter, the dissepiments distinctly marked; the endochrome at first filling the tube, at length constricted at the dissepiments. "Eventually, the joints divide in the centre by a transverse line, and the mass separates; a new diaphragm is then gradually formed, and finally a new joint."—*Phyc. Brit.* Substance rather rigid, and not very firmly adhering to the paper. Colour, at first dark green, at length pale yellowish or brownish green in decay.

From the slight uncertainty in the nomenclature of this species, and the variableness in the characters of specimens referred to it, we would be disposed to think it not improbable that more than one species may still be included under the name of *C. linum*; but these plants are so simple in their structure, and their characters so few and withal so variable, or so little known, that, in the present state of our knowledge of their history, it is no easy matter to fix the limits of the species.



CONFERVA LINUM.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—Filaments, natural size.
2.—Portion of filament, greatly magnified.

CONFERVA SUTORIA.—*Berk.*

GEN. CHAR.—Filaments simple, either free or attached, articulated. Fructification "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

CONFERVA *sutoria.*—Filaments extremely slender, capillary, continuous, free, floating or procumbent, forming widely extending strata; articulations about once and a-half as long as their diameter.

CONFERVA *sutoria.*—*Berk. Gl. Alg.* t. 14, f. 3; *Harv. P. B.* plate 150 B.; *Harv. Man.* p. 208; *Harv. Syn.* p. 176; *Atlas*, plate 72, fig. 336.

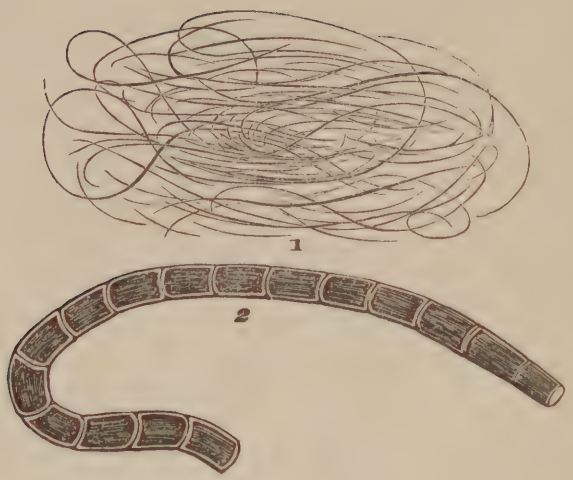
ÆTOMORPHA *sutoria.*—*Harv. N. B. A.* part 3, p. 87.

HAB.—In pools and ditches subject to the influence of the tide. Not uncommon.

GEOGR. DIST.—England; N. America; ——?

DESCRIPTION.—Strata widely spreading, and entangled, floating, or procumbent on the damp, muddy shore, formed of several thin strata spread the one over the other, and which may be readily lifted up by the hand without laceration for a foot or more. Filaments very slender, unattached, and continuous, variously twisted and entangled. Articulations cylindrical, once to once and a-half as long as their diameter. Substance rather rigid, scarcely adhering to paper. Colour, when young, deep green; when old a pale yellowish green or greenish yellow.

This appears to us to be rather a common species, forming sometimes extensive strata in ditches and pools, or spreading on the damp shore when the tide has receded. Our specimens, gathered near Fort George, (where the plant formed wide strata piled one above another), in the lower strata were of a dark green colour, the upper greenish yellow, and covered by Diatoms. These strata were easily separable by the hand almost to any extent, a property which is, perhaps, not peculiar to the species, as Captain Carmichael remarks a similar character in *C. arenosa.*



CONFERVA SUTORIA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Conferva sutoria*, filament, natural size.
2.—Portion of filament magnified.

CONFERVA MELAGONIUM.—*Web. et Mohr.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *melagonium.*—Filaments attached by a minute disc, single or but very rarely and slightly tufted, rather stout, rigid, and wiry, erect; articulations about twice as long as their diameter.

Conferva *melagonium.*—*Web. et Mohr, It. Suec.* p. 194, t. 3, f. 2, *a. b.*; *Roth, Cat. Bot.* vol. iii. p. 254; *Dillw. Int.* p. 48, Suppl. t. B.; *Ag. Syn.* p. 84; *Lyngb. Hyd. Dan.* p. 148, t. 51; *Ag. Syst.* p. 99; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 354; *Harv.* in *Mack. Fl. Hib.* part 3, p. 226; *Harv. P. B.* plate 99 A.; *Harv. Man.* p. 209; *Harv. Syn.* p. 177; *Atlas*, plate 69, fig. 326 A.; *Wyatt, Alg. Danm.* No. 221; *Kütz. Phyc. Gen.* p. 260.

Chætomorpha *melagonium.*—*Harv. N. B. A.* part 3, p. 85.

Hab.—In deep tide-pools, on rocks and stones, near low-water. Perennial. Not uncommon.

Geogr. Dist.—Northern and German Oceans; Iceland; Greenland; shores of North America.

Description.—Filaments attached by a minute flat disc, three to six inches in length, rarely tufted, generally scattered in single plants over the rocky pool, erect, or, when of considerable length, bending gracefully to one side, very rigid and wiry, but not brittle, of uniform thickness throughout. Articulations cylindrical, at length slightly inflated in the middle, pretty uniformly twice as long as their diameter. Substance very tough and elastic, scarcely adhering to the paper. Colour, a deep dark green.

This fine species is rather generally distributed round all our shores; but from its scattered mode of growth, and its partiality to shallow clear pools, it is by no means abundant anywhere. It is the handsomest species of the genus found in Britain, as well as the most robust and deeply coloured. So tough and permanent are its filaments, that they may be often seen late in spring standing erect in their native pool, "like pale ghosts and disembodied creatures," after having withstood the buffeting of the winter's storm, white and transparent, the whole of the

endochrome having escaped by the end of the tube. It is widely distributed on both the eastern and western shores of the North Atlantic, extending from the coast of France to the North Cape on the east, and from those of "Boston" on the west to latitude 75° N., whence we have received it, collected by Mr. James Taylor, of Aberdeen.

CONFERVA MELAGONIUM.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Conferva melagonium*, one-half natural size.
2.—Portion of filament, magnified.

CONFERVA ÆREA.—*Dillw.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *ærea.*—Filaments attached by a minute disc, rather robust, elongate, much tufted, rather rigid and brittle; articulations about as long as their diameter.

Conferva *ærea.*—*Dillw. Conf.* t. 80; *E. Bot.* t. 1929; *Lyngb. Hyd. Dan.* p. 147, t. 51; *Ag. Syst.* p. 100; *Wyatt, Alg. Danm.* No. 191; *Mont. Canar.* p. 184; *J. Ag. Alg. Medit.* p. 12; *Kütz. Phyc. Gen.* p. 258; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 354; *Harv.* in *Mack. Fl. Hib.* part 3, p. 226; *Harv. P. B.* plate 99 B. *Harv. Man.* p. 209; *Harv. Syn.* p. 178; *Atlas*, plate 69, fig. 326 A.

Conferva *antemnina.*—*Bory, Dict. Class.* t. 4, p. 392.

Chætomorpha *ærea.*—*Harv. N. B. A.* part 3, p. 86.

Hab.—On sand-covered rocks, and on stones in sandy bays. Common.

Geogr. Dist.—Atlantic coasts of Europe; Mediterranean Sea; Canary Islands.

Description.—Filaments much tufted, elongate, attached by a minute flat disc, six inches to a foot or more in length, rather robust, rigid and brittle, but not erect. Articulations cylindrical, about as long as or sometimes a little longer than broad. Substance much less tough and firm than in *C. melagonium*, but very imperfectly adhering to paper. Colour, a fine bright yellowish green when fresh, fading in age and when dried, (unless the specimens were gathered young), to a pale yellowish white.

A beautiful species, closely allied to the last, but with much more slender and more elongated, always tufted filaments. The habitat is also quite different, as it delights in sand-covered rocks, or on small stones in sandy or muddy bays, where its roots are often an inch or more imbedded in the sand. When fresh, its filaments are extremely beautiful, of a much paler yellowish green colour than the last, but very evanescent, and the plant when dried is generally of a dirty yellowish white. From the last species it may also be readily distinguished by its shorter articulations.

CONFERVA ÆREA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Conferva ærea*, one-fourth natural size.
2.—Portion of filament, magnified.

CONFERVA COLLABENS.—*Ag.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *collabens.*—"Filaments elongated, straight, tufted, very thick (but of various diameters), gelatinous and flaccid, of a splendid æruginous green colour. Articulations from once to once and a half as long as broad, filled with a dense granular mass."—*Phyc. Brit.*

Conferva *collabens.*—*Ag. Syst. Alg.* p. 102; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 354; *Harv. P. B.* plate 327; *Harv. Man.* p. 209; *Harv. Syn.* p. 178; *Harv. Atlas*, plate 69, fig. 327.

Conferva *ærea*, β. *lubrica.*—*Dillw. Syn.* p. 48.

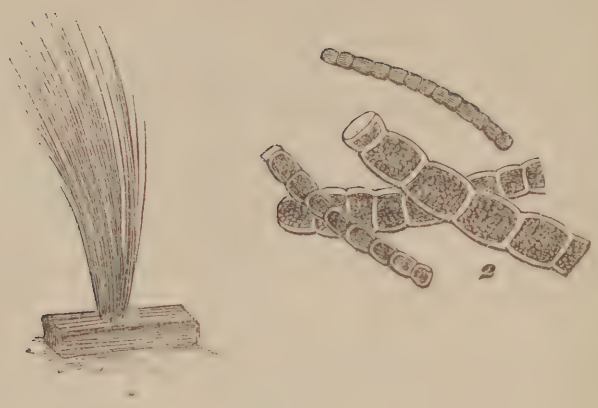
Hormotrichum *collabens.*—*Kütz. Sp. Alg.* p. 383.

Hab.—At Yarmouth, on a floating piece of timber (*Sir W. J. Hooker*). Only once found.

Geogr. Dist.—German Ocean.

Description.—"Filaments densely tufted, three or four inches long or more, of very various diameters in the same tuft, the largest ones being twice as thick as *C. ærea* or more, the smaller not measuring one-fourth as much in diameter. Articulations generally somewhat longer than their diameter, filled with a brilliantly-coloured, granular, and dense mass of endochrome. The dissepiments much contracted, and the walls of the cells thick. Substance very flaccid and gelatinous, adhering most closely to paper. The colour is a perfectly rich green, and is well preserved in drying."—*Phyc. Brit.*

With the above species we are wholly unacquainted, and are not aware of its occurrence in recent times, the specimen in the herbarium of Sir W. J. Hooker being the only one, we believe, ever met with in this country. The inflated cells, its soft and lubricous substance, and the great difference in the thickness of the filaments, are its peculiar characteristics.



CONFERVA COLLABENS.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Conferva collabens*, tuft, natural size.
2.—Filaments, magnified.

CONFERVA BANGIOIDES.—*Harv.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *bangioides.*—Filaments attached by a minute disc, very slender, soft, lubricous, and wavy; articulations cylindrical, about twice as long as broad, dissepiments slightly contracted, distinct, and pellucid, walls rather thick.

Conferva *bangioides.*—*Harv. P. B.* plate 268; *Harv. Man.* p. 210; *Harv. Syn.* p. 178; *Atlas*, plate 70, fig. 328.

Hab.—Exposed rocks, near low water. Annual. Summer. Montrose Ness, rock-pools; Bay of Nig, near Aberdeen; Plymouth; Torquay; Ballycotton.

Geogr. Dist.—British Isles?

Description.—Filaments much tufted or rather cæspitose, attached by a minute disc, three to six inches or more in length, very slender, soft and lubricous, cylindrical, obtuse, very variable in their diameter. Articulations about twice as long as their diameter, or nearly so, cylindrical or at length somewhat inflated and slightly contracted at the dissepiments, which are distinct and pellucid, the walls of the cells thick, the endochrome at first of a fine yellowish green, completely filling the cell, at length contracted into a dark green oval mass. Substance very flaccid and closely adhering to paper.

This pretty species seems to be rather frequent on the east coast, generally growing on very exposed rocks near low water, whence as soon as it reaches maturity it is soon swept away by the lashing of the waves. In habit it very much resembles *Lyngbya majuscula*, but under the microscope the difference is at once apparent.

CONFERVA BANGIOIDES.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Conferva bangioides*, tuft, natural size.
2.—Filaments, magnified.

CONFERVA YOUNGANA.—*Dillw.*

Gen. Char.—Filaments simple, either free or attached, articulated. Fructification: "Aggregated granules or zoospores, contained in the articulations, and having at some period a proper ciliary motion."—*Phyc. Brit.* Name from *conferruminare*, "to harden or strengthen," some of the species having been employed in ancient times to bind up broken limbs.

Conferva *Youngana*.—Filaments attached by a minute disc, much tufted, straight and rigid, cylindrical and obtuse. Articulations cylindrical, one and a half to twice as long as their diameter, the walls rather thick, the dissepiments somewhat contracted, distinct and pellucid.

Conferva *Youngana*.—*Dillw. Conf.* t. 102; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 354; *Harv. P. B.* plate 328; *Harv. Man.* p. 210; *Harv. Syn.* p. 179; *Atlas*, plate 72, fig. 337; *Ag. Syst.* p. 101.

Conferva *isogona*.—*E. Bot.* t. 1930.

Hormotrichum *Younganum*.—*Kütz. Sp. Alg.* p. 382; *Harv. N. B. A.* part 3, p. 89.

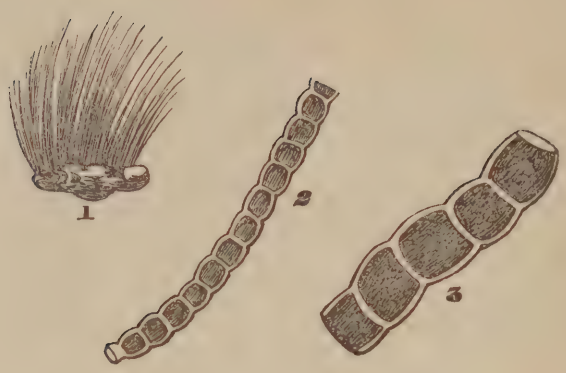
Hormotrichum *isogonum*.—*Kütz. Sp. Alg.* p. 382.

Hab.—On exposed rocks, &c. Annual. Summer. Yarmouth; Glamorganshire; Montrose. Not uncommon.

Geogr. Dist.—Shores of Northern Europe, and Atlantic shores of N. America.

Description.—Filaments densely tufted, attached by a minute flat disc, straight, cylindrical, and obtuse, about an inch in length, forming small tufts, "or spreading in wide shaggy fleeces over the surface of the rock." Articulations at first cylindrical, at length somewhat inflated and contracted at the dissepiments, which are distinct and pellucid, the walls of the cells are rather thick; the endochrome of large grains, at first entirely filling the cell, at length contracted into roundish oblong masses. "Finally it is changed into a bipartite sporidium, lodged in a swollen and colourless cell." Substance rather rigid, but more or less adhering to paper. Colour, a dark green, without gloss, not changing in drying.

This species has very much the appearance of dwarf specimens of *C. bangioides*, from which it may perhaps be best distinguished by its somewhat shorter cells, less lubricous and glossy filaments, and chiefly by its smaller size. They may sometimes be seen growing side by side, and the present species is by no means uncommon.



CONFERVA YOUNGANA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Conferva Youngana*, tuft, natural size.
2, 3.—Filaments, greatly magnified.

OCHLOCHÆTE HYSTRIX.—*Thw. MSS.*

Gen. Char. — "Frond disciform, appressed; filaments cylindrical, radiating from a central point, irregularly branched; consisting of a single series of cells, each of which is most commonly produced above into a rigid inarticulated seta. Endochrome green. Fructification unknown. Name from ὄχλος, "a multitude," and χαίτη, "a bristle."—*Phyc. Brit.*

Ochlochæte *hystrix.*—"Plant very minute, pale green, hoary from its numerous rigid setæ."—*Phyc. Brit.*

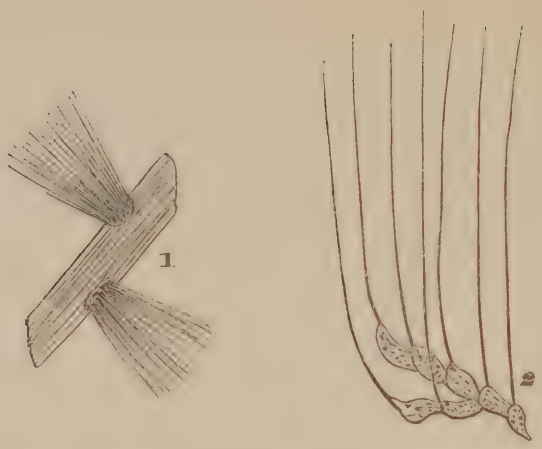
Ochlochæte *hystrix.—Thw. MSS.*; *Harv. P. B.* plate 226; *Harv. Man.* p. 211; *Harv. Syn.* p. 179; *Atlas*, plate 72, fig. 338.

Hab.—On stems of grasses, &c., in a lake of brackish water, called "The Little Sea," near Wareham, Dorset (*Rev. W. Smith*); also in fresh-water ditches near Bristol, upon the leaves of mosses, very rare (*G. H. K. Thwaites*).

Geogr. Dist.—— ?

Description.—"Plant disciform, frequently irregular in its outline, very minute, pale green, hoary from the multitude of rigid setæ with which it is covered. Filaments closely adpressed and adhering firmly to the substance on which the plant may be growing; radiating from a central point, irregularly branched, and frequently cohering laterally. Cells oblong, each usually furnished with a very long rigid tubular diaphanous seta. Endochrome granular, green. The fructification has not been observed. It is possible that the fresh-water specimens from the neighbourhood of Bristol may prove specifically distinct from the Wareham plant."—*Phyc. Brit.*

The above, copied from *Phyc. Brit.*, where the plant is beautifully figured, is all we know of this curious plant, which we have never met with, although it may possibly be not uncommon, its minute size often, perhaps, preventing its detection.



OCHLOCHÆTE HYSTRIX.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Ochlochæte hystrix*, plants, natural size.
2.—Portion, greatly magnified.
(Reduced from *Phyc. Brit.*)

ENTEROMORPHA CORNUCOPIÆ.—*Hook.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *cornucopiæ.*—Fronds single or slightly tufted, gregarious from a short cylindrical stem, suddenly expanding into a subcylindrical, tubular, closed, at length open funnel-shaped frond, plaited upwards, the margins entire, or more or less torn or laciniated.

Enteromorpha *cornucopiæ.*—*Hook. Br. Fl.* vol. ii. p. 313; *Harv. P. B.* plate 304; *Harv. Man.* p. 213; *Harv. Syn.* p. 180; *Atlas*, plate 72, fig. 339.

Scytosiphon *intestinalis*, γ *cornucopiæ.*—*Lyngb. Hyd. Dan.* p. 67.

Solenia *intestinalis*, γ *cornucopiæ.*—*Ag. Syst.* p. 185.

Ulva *intestinalis*, γ *cornucopiæ.*—*Ag. Sp. Alg.* vol. i. p. 419; *Wahl. Fl. Lapp.* p. 505; *Kütz. Sp. Alg.* p. 478.

Hab.—On Corallines, &c., in pools left by the tide. Annual. Spring and early summer. Not uncommon on the Scottish coasts.

Geogr. Dist.—Shores of Northern Europe.

Description.—Root, a minute flat disc. Fronds with short cylindrical stems, from a quarter to half an inch or rather more in length, suddenly dilated into a short subcylindrical frond, two to three inches in length, and from half an inch to an inch in diameter, at first closed at the summit, but at length open, expanded and funnel-shaped, but never very regular in its form, always more or less plaited upwards, the margin sometimes nearly entire, but most frequently more or less torn and laciniated. Structure consisting of a single series of very irregularly quadrate cells. Substance membranaceous, flaccid, and closely adhering to paper. Colour, a fine delicate yellowish green, not changing in drying.

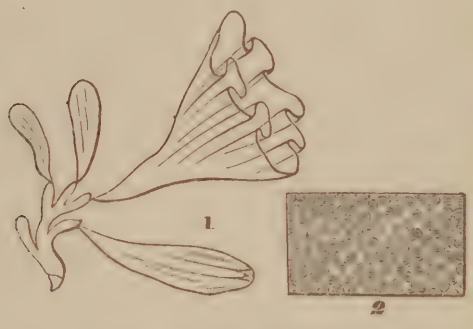
This pretty little species is distinguished from the following more common form by its more delicate green colour, smaller size, and somewhat larger cells. It is abundant during the early months of summer on the east coast of Scotland. It delights in shallow weedy pools, extending almost from high- to near low-water mark, or on a sloping gravelly shore. It does not grow either on the rocks or

stones, however, but is always parasitical on the smaller Algæ and Corallines.

It has some resemblance to *Ulva lactuca*, but may be readily distinguished by its smaller size, more cylindrical fronds, more delicate colour, more evident stem, and rather larger cellules, arranged in irregular lines, and never in fours.

From the next species, although perhaps really distinct, it is not always an easy task to distinguish it. The chief marks of distinction are the smaller size (?), more yellowish green colour, more delicately membranous and reticulated structure, more evident stem, and less tapering base, shorter, and when opened, more distinctly funnel-shaped frond.

That species also scarcely recognises any limit, either in time, space, or habitat, whereas the present species is much more limited in its distribution, and less permanent in its duration, seldom surviving beyond the end of May or middle of July.



ENTEROMORPHA CORNUCOPIÆ.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—Plant of *Enteromorpha cornucopiæ*, one-half natural size.
2.—Surface cells, magnified.

Plate CXCVIII.

ENTEROMORPHA INTESTINALIS.—*Link.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *intestinalis.*—Fronds always perfectly simple, elongated, much inflated, especially when old, gradually tapering from the base to an obtuse point.

Enteromorpha *intestinalis.*—*Link. Hor. Phys. Ber.* p. 5; *Grev. Alg. Brit.* p. 179; *Hook. Br. Fl.* vol. ii. p. 313; *Wyatt, Alg. Danm.* No. 80; *E. Bot.* Suppl. t. 2756; *Kütz. Phyc. Gen.* p. 300; *Harv.* in *Mack. Fl. Hib.* part 3, p. 242; *Harv. P. B.* plate 154; *Harv. Man.* p. 213; *Harv. Syn.* p. 180; *Atlas*, plate 70, fig. 329; *Harv. N. B. A.* part 3, p. 57.

Solenia *intestinalis.*—*Ag. Syst. Alg.* p. 185; *Spr. Syst. Veg.* vol. iv. p. 367.

Solenia *Bertolini.*—*Ag. Syst. Alg.* p. 185; *Spr. Syst. Veg.* vol. iv. p. 367.

Scytosiphon *intestinalis.*—*Lyngb. Hyd. Dan.* p. 67.

Fistularia *intestinalis.*—*Grev. Fl. Edin.* p. 300.

Ilea *intestinalis.*—*Gaill. Dict. Sc. Nat.* vol. liii. p. 373.

Tetraspora *intestinalis.*—*Des. Fl. Angers.* p. 17.

Ulva *intestinalis.*—*Linn. Huds. Fl. Ang.* p. 568; *Lightf. Fl. Scot.* p. 968; *Ag. Syn.* p. 45; *Ag. Sp. Alg.* vol. i. p. 418; *Hook. Fl. Scot.* part 2, p. 91.

Conferva *intestinalis.*—*Roth, Cat. Bot.* vol. i. p. 159.

Hab.—Growing on various substances in the sea, generally between tide-marks; also in brackish ditches near the coast; sometimes floating. Annual. Summer. Very common.

Geogr. Dist.—In such situations as the above all over the world of waters.

Description.—Root, a minute disc. Fronds from a very slender base, much elongated, and gradually tapering to an obtuse, rounded point, six inches to several feet in length, and gradually dilating from a diameter of half a line at the base to from half an inch to three or four inches in diameter at the top, which is at first closed, but ultimately becomes open and eroded at the margins. Surface sometimes smooth and regular, at other times very much crisped, puckered or curled, contracted, and twisted. Structure of very irregularly quadrate or roundish oblong cells, disposed in irregular lines. Substance thin and membranous, scarcely adhering to the paper in drying. Colour, a rather dark, dull green without gloss, not changing in drying.

This is not only one of the largest but one of the most generally—perhaps it would not be too much to say universally—distributed of British *Chlorosperms*. In some stage or other of its growth, it may be found almost on every shore, and at every season; extremely polymorphous in its habit, in some of its forms closely approaching the next species, but understood to be always perfectly simple or without branches.

It prefers shallow, rocky pools, between tides, but we have seen it, in large, sheltered bays, from two to three feet in length, and three to four inches in diameter at the apex. Sometimes the frond becomes split, even to the base, and then presents the appearance of a broad, obcuncate membrane.

The colour is generally a deep but rather dull green, changing to a rather clear yellow in age and decay. When young, it is almost cylindrical, but gradually becomes more inflated in age, until the membrane bursts at the summit, when it becomes gradually eroded, soon passing into decay. No sooner, however, do the old fronds pass away than the young ones make their appearance, so that the plant may be found at all seasons in some stage of its growth.

EXPLANATION OF PLATE CXCVIII.

Fig. 1.—*Enteromorpha intestinalis*, natural size.
2.—Transverse section.
3.—Surface cells. Both magnified.

ENTEROMORPHA intestinalis, LINK.

Nature Printed by Henry Bradbury.

Plate CXCIX.

ENTEROMORPHA COMPRESSA.—*Grev.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφή, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *compressa.*—Fronds more or less branched, cylindrical at the base, generally compressed upwards, and very obtuse, much attenuated towards the base.

Enteromorpha *compressa.*—*Grev. Alg. Brit.* p. 180, t. 18; *Hook. Br. Fl.* vol. ii. p. 314; *Wyatt, Alg. Danm.* No. 165; *Kütz. Sp. Alg.* p. 480; *Harv.* in *Mack. Fl. Hib.* part 3, p. 242; *Harv. P. B.* plate 335; *Harv. Man.* p. 213; *Harv. Syn.* p. 181; *Atlas*, plate 70, fig. 330; *Harv. N. B. A.* part 3, p. 57.

Solenia *compressa.*—*Ag. Syst. Alg.* p. 186.

Fistularia *compressa.*—*Grev. Fl. Edin.* p. 300.

Ulva *compressa.*—*Linn. Fl. Suec.* p. 433; *Lightf. Fl. Scot.* vol. ii. p. 969; *Ag. Sp. Alg.* vol. i. p. 420; *E. Bot.* t. 2739.

Ilea *compressa.*—*Gaill. Dict. Sc. Nat.* vol. iii. p. 373.

Scytosiphon *compressus.*—*Lyngb. Hyd. Dan.* p. 64, t. 15 A, B.

Conferva *compressa.*—*Roth, Cat. Bot.* vol. i. p. 161.

Hab.—On rocks, stones, &c., in the sea, and in æstuaries, &c. Annual. Spring and summer, but found most of the year. Very common.

Geogr. Dist.—Common throughout temperate latitudes in both hemispheres.

Description.—Root, a minute disc. Fronds much tufted or cæspitose; from a quarter of an inch in length or even less to eight or ten inches or even two feet, and from half a line or less in breadth to a quarter of an inch, filiform at the base, and generally cylindrical, gradually widening upwards to the apex, which is rounded and obtuse, more or less compressed in the upper part; sometimes very much inflated, puckered, or crisped; always more or less branched, sometimes with only a single branch, or two or three near the base; at other times the whole frond is branched to the apex. Branches sometimes simple, at other times repeatedly divided, all the divisions attenuated towards the base, and obtuse at the apex. Substance rather firm and membranous, not at all adhering to paper. Colour, a fine bright green, generally glossy when dry.

A most polymorphous as it is a most common species, growing everywhere and on everything that presents itself, in sheltered bays and on exposed rocks and stones, wood, or even iron, and consequently presenting every possible state of development.

On rocks, &c., at and even above high-water mark it may be gathered of microscopic minuteness, forming a thin green stratum, scarcely colouring the surface. In sheltered bays it may be found two feet or more in length ; the first has seldom more than one or two simple branches, the second is often furnished from the base to the apex with numerous simple or repeatedly divided branches, and between these two extremes every possible form or variety may be observed.

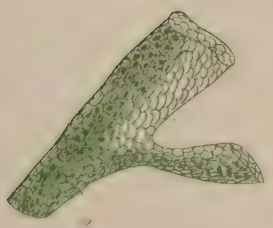
From the last species it can only be distinguished by the branching, *E. intestinalis* being understood to be always simple ; from all the following species it may be readily known by its obtuse apices, all the divisions being gradually inflated or widened upwards, and generally more or less compressed.

There is, perhaps, no plant more generally distributed than the present species, being equally abundant in the southern as in the northern hemisphere, in tropical as in temperate climes, "on floating timber, on piles exposed to the tide, and on the vertical walls of quays in tidal rivers ; in fact, in nine cases out of ten, when such objects are seen clad in green, the appearance is caused by the presence of this species."—*Phyc. Brit.*

EXPLANATION OF PLATE CXCIX.

Fig. 1.—*Enteromorpha compressa*, natural size.
2.—Portion of a frond and branch.
3.—Section of same. Both magnified.

1



2

3

ENTEROMORPHA Compressus. GREV.

Nature Printed by Henry Bradbury.

ENTEROMORPHA LINKIANA.—*Grev.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *Linkiana*.—"Frond tubular, cylindrical, filiform, reticulated, pellucid, of a very pale green colour, membranous (rigid when dry), much branched; branches attenuate."—*Grev. Alg. Brit.* p. 182.

Enteromorpha *Linkiana*.—*Grev. Alg. Brit.* p. 182; *Hook. Br. Fl.* vol. ii. p. 314; *Harv. P. B.* plate 344; *Harv. Man.* p. 213; *Harv. Syn.* p. 181; *Atlas*, plate 70, fig. 331; *Kütz. Sp. Alg.* p. 481.

Hab.—Between tide-marks. Annual. Summer. At Appin (*Captain Carmichael*); Montrose (*A. C.*). Not uncommon.

Geogr. Dist. —— ?

Description.—"Root, a minute disc. Frond six to twelve inches in length, filiform, cylindrical, tubular, inflated, rising with a main stem about one line in diameter, on all sides of which, and along the whole length, the branches are inserted. Branches two to six inches long, smaller in diameter than the stem, between erect and spreading, set with a second series one or two inches long, which in their turn bear a third, which are quite capillary, all of them much attenuated towards the extremity. The structure distinctly reticulated, the reticulations roundish but angular. Fructification, three or four subglobose granules within many of the articulations. Substance membranaceous, but firm and somewhat cartilaginous when dry, adhering very imperfectly to paper. Colour, a very pale yellowish green."—*Grev.* in *Phyc. Brit.*

If we rightly understand this species, it is by no means an uncommon form. On the Forfarshire coast it is common in rock-pools between tides, in which when it selects a stone, it generally covers it to the exclusion of everything else, its soft, silky, Conferva-like fronds hanging down on each side when the water is still, as if carefully combed by the hand of the barber, or with the gentle swell waving like the flaxen locks on the mermaid's brow.

In deep water the colour is of a bright, deep green, but in shallow pools the colour is a pale greenish yellow, into which colour the species all pass when age or decay comes upon them.

ENTEROMORPHA intestinalis, LINK.

Nature Printed by Henry Bradbury.

Plate CXCIX.

ENTEROMORPHA COMPRESSA.—*Grev.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *compressa.*—Fronds more or less branched, cylindrical at the base, generally compressed upwards, and very obtuse, much attenuated towards the base.

Enteromorpha *compressa.*—*Grev. Alg. Brit.* p. 180, t. 18; *Hook. Br. Fl.* vol. ii. p. 314; *Wyatt, Alg. Danm.* No. 165; *Kütz. Sp. Alg.* p. 480; *Harv.* in *Mack. Fl. Hib.* part 3, p. 242; *Harv. P. B.* plate 335; *Harv. Man.* p. 213; *Harv. Syn.* p. 181; *Atlas*, plate 70, fig. 330; *Harv. N. B. A.* part 3, p. 57.

Solenia *compressa.*—*Ag. Syst. Alg.* p. 186.

Fistularia *compressa.*—*Grev. Fl. Edin.* p. 300.

Ulva *compressa.*—*Linn. Fl. Suec.* p. 433; *Lightf. Fl. Scot.* vol. ii. p. 969; *Ag. Sp. Alg.* vol. i. p. 420; *E. Bot.* t. 2739.

Ilea *compressa.*—*Gaill. Dict. Sc. Nat.* vol. iii. p. 373.

Scytosiphon *compressus.*—*Lyngb. Hyd. Dan.* p. 64, t. 15 A, B.

Conferva *compressa.*—*Roth, Cat. Bot.* vol. i. p. 161.

Hab.—On rocks, stones, &c., in the sea, and in æstuaries, &c. Annual. Spring and summer, but found most of the year. Very common.

Geogr. Dist.—Common throughout temperate latitudes in both hemispheres.

Description.—Root, a minute disc. Fronds much tufted or cæspitose; from a quarter of an inch in length or even less to eight or ten inches or even two feet, and from half a line or less in breadth to a quarter of an inch, filiform at the base, and generally cylindrical, gradually widening upwards to the apex, which is rounded and obtuse, more or less compressed in the upper part; sometimes very much inflated, puckered, or crisped; always more or less branched, sometimes with only a single branch, or two or three near the base; at other times the whole frond is branched to the apex. Branches sometimes simple, at other times repeatedly divided, all the divisions attenuated towards the base, and obtuse at the apex. Substance rather firm and membranous, not at all adhering to paper. Colour, a fine bright green, generally glossy when dry.

A most polymorphous as it is a most common species, growing everywhere and on everything that presents itself, in sheltered bays and on exposed rocks and stones, wood, or even iron, and consequently presenting every possible state of development.

On rocks, &c., at and even above high-water mark it may be gathered of microscopic minuteness, forming a thin green stratum, scarcely colouring the surface. In sheltered bays it may be found two feet or more in length; the first has seldom more than one or two simple branches, the second is often furnished from the base to the apex with numerous simple or repeatedly divided branches, and between these two extremes every possible form or variety may be observed.

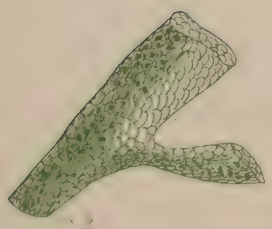
From the last species it can only be distinguished by the branching, *E. intestinalis* being understood to be always simple; from all the following species it may be readily known by its obtuse apices, all the divisions being gradually inflated or widened upwards, and generally more or less compressed.

There is, perhaps, no plant more generally distributed than the present species, being equally abundant in the southern as in the northern hemisphere, in tropical as in temperate climes, "on floating timber, on piles exposed to the tide, and on the vertical walls of quays in tidal rivers; in fact, in nine cases out of ten, when such objects are seen clad in green, the appearance is caused by the presence of this species."—*Phyc. Brit.*

EXPLANATION OF PLATE CXCIX.

Fig. 1.—*Enteromorpha compressa*, natural size.
2.—Portion of a frond and branch.
3.—Section of same. Both magnified.

1



2

3

ENTEROMORPHA Compressus, GREV.

Nature Printed by Henry Bradbury.

ENTEROMORPHA LINKIANA.—*Grev.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *Linkiana.*—"Frond tubular, cylindrical, filiform, reticulated, pellucid, of a very pale green colour, membranous (rigid when dry), much branched; branches attenuate."—*Grev. Alg. Brit.* p. 182.

Enteromorpha *Linkiana.*—*Grev. Alg. Brit.* p. 182; *Hook. Br. Fl.* vol. ii. p. 314; *Harv. P. B.* plate 344; *Harv. Man.* p. 213; *Harv. Syn.* p. 181; *Atlas*, plate 70, fig. 331; *Kütz. Sp. Alg.* p. 481.

Hab.—Between tide-marks. Annual. Summer. At Appin (*Captain Carmichael*); Montrose (*A. C.*). Not uncommon.

Geogr. Dist. —— ?

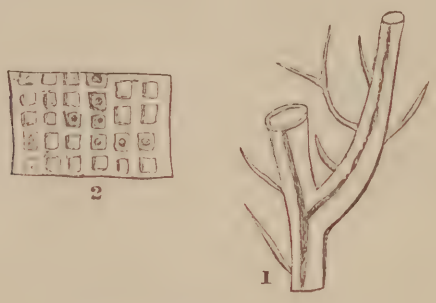
Description.—"Root, a minute disc. Frond six to twelve inches in length, filiform, cylindrical, tubular, inflated, rising with a main stem about one line in diameter, on all sides of which, and along the whole length, the branches are inserted. Branches two to six inches long, smaller in diameter than the stem, between erect and spreading, set with a second series one or two inches long, which in their turn bear a third, which are quite capillary, all of them much attenuated towards the extremity. The structure distinctly reticulated, the reticulations roundish but angular. Fructification, three or four subglobose granules within many of the articulations. Substance membranaceous, but firm and somewhat cartilaginous when dry, adhering very imperfectly to paper. Colour, a very pale yellowish green."—*Grev.* in *Phyc. Brit.*

If we rightly understand this species, it is by no means an uncommon form. On the Forfarshire coast it is common in rock-pools between tides, in which when it selects a stone, it generally covers it to the exclusion of everything else, its soft, silky, Conferva-like fronds hanging down on each side when the water is still, as if carefully combed by the hand of the barber, or with the gentle swell waving like the flaxen locks on the mermaid's brow.

In deep water the colour is of a bright, deep green, but in shallow pools the colour is a pale greenish yellow, into which colour the species all pass when age or decay comes upon them.

We have met with specimens perfectly agreeing with the above character and description, but numerous other forms may be collected, exhibiting a multitude of intermediate states between this and the following species, and almost induce the conviction that it is only one of the many forms of an exceedingly polymorphous species.

The principal difference between this and the following, *E. erecta*, seems to be the more patent, scattered branches, which give to the plant a very distinct and peculiar habit, but one very difficult to express clearly and intelligibly in words; hence the little difference in the specific characters.



ENTEROMORPHA LINKIANA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Portion of branch and ramuli.
2.—Portion of membrane with fertile cells. Both magnified.

Plate CC.

ENTEROMORPHA ERECTA.—*Hook.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφή, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *erecta*.—"Frond cylindrical, filiform, slender; branches erect, opposite, or alternate, all attenuated to a fine point; ramuli capillary, erecto-patent; reticulations rectangular, nearly square, arranged in many longitudinal lines."—*Phyc. Brit.*

Enteromorpha *erecta*.—*Hook. Br. Fl.* vol. ii. p. 314; *Wyatt, Alg. Danm.* No. 166; *Harv. P. B.* plate 43; *Harv. Man.* p. 214; *Harv. Syn.* p. 182; *Atlas*, plate 71, fig. 332.

Enteromorpha *clathrata*, β *erecta*.—*Grev. Alg. Brit.* p. 181; *Harv.* in *Mack. Fl. Hib.* part 3, p. 242.

Scytosiphon *erectus*.—*Lyngb. Hyd. Dan.* p. 65, t. 15.

Fistularia *erecta*.—*Grev. Fl. Edin.* p. 300.

Solenia *clathrata*, var. *confervoidea*.—*Ag. Syst. Alg.* p. 187.

Hab.—On rocks and stones in the sea, and in dark pools at half-tide level; dredged in four to eight fathoms water. Annual. Spring and summer. Common.

Geogr. Dist.—Temperate latitudes of both hemispheres.

Description.—Root, a minute disc. Fronds densely tufted or cæspitose, four to six inches or more in height, extremely slender, cylindrical; main stem attenuated at each end, everywhere set with opposite or alternate or irregular capillary branches of nearly equal length, but rather longest in the middle, giving the frond a linear lanceolate outline. These branches are generally undivided, but are everywhere beset with rather short slender ramuli, all which are attenuated to a fine point, giving the whole branch a very light and feathery appearance. They are generally irregularly scattered, sometimes with a tendency to become distichous. Structure cellular, cells rather large for the size of the plant, nearly quadrangular, arranged in more or less regular longitudinal lines. Substance delicately membranous, somewhat flaccid, and adhering to the paper. Colour, a fine bright glossy green, not changing in drying.

This fine and beautiful species seems much less common than the last;

we have not met with it ourselves, although we have received specimens both from the northern and southern extremities of the island, and believe it to be scattered, perhaps not unfrequently, over the whole intermediate space. So like, however, in external appearance are these plants to each, and so imperceptibly do the different forms or species shade into each other, that it is not impossible that it may be often overlooked or mistaken for some of the others, or for a species of *Conferva* or *Cladophora*, which its very slender and delicate fronds very much resemble ; indeed, we have received, not only the present, but some of the other species referred to the genus *Cladophora*, and have oftener than once collected them as such, and only discovered our mistake on our return home, by the aid of our *sine quâ non*, the microscope.

EXPLANATION OF PLATE CC.

Fig. 1.—*Enteromorpha erecta*, natural size.
2.—Branch.
3.—Cells of surface. Both magnified.

ENTEROMORPHA erecta. Hook.

Nunn Printed by Henry Bradbury.

ENTEROMORPHA CLATHRATA.—*Grev.*

GEN. CHAR.—Fronds membranous, tubular, reticulated. Fructification : consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

ENTEROMORPHA *clathrata.*—Fronds extremely slender, cylindrical and filiform, highly reticulated, much branched ; branches patent or recurved, long and slender, everywhere beset with short patent or recurved spine-like ramuli.

ENTEROMORPHA *clathrata.—Grev. Alg. Brit.* p. 181 (in part) ; *Hook. Br. Fl.* vol. ii. p. 315 ; *Wyatt, Alg. Danm.* No. 34 ; *Kütz. Sp. Alg.* p. 479 ; *Harv. P. B.* plate 340 ; *Harv. Man.* p. 214 ; *Harv. Syn.* p. 182 ; *Atlas,* plate 71, fig. 333 ; *Harv. N. B. A.* part 3, p. 57.

SOLENIA *clathrata.—Ag. Syst. Alg.* p. 186.

SCYTOSIPHON *clathratus.—Lyngb. Hyd. Dan.* p. 66, t. 16.

SCYTOSIPHON *paradoxus.—Fl. Dan.* t. 1595, f. 2.

ULVA *clathrata.—Ag. Syn.* p. 46.

CONFERVA *clathrata.—Roth, Cat. Bot.* vol. iii. p. 175.

CONFERVA *paradoxa.—Dillw. Conf.* p. 70, t. F. ; *E. Bot.* t. 2328.

HAB.—In rock-pools between tide-marks. Annual. Spring and summer. Common.

GEOGR. DIST.—Shores of Europe and North America.

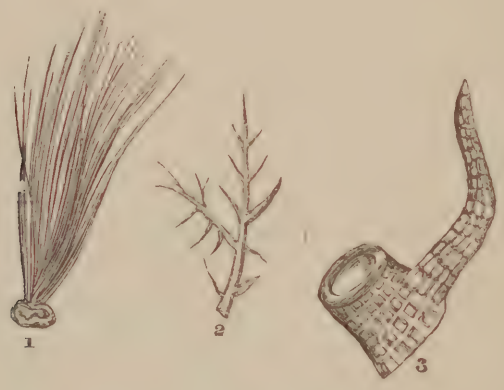
DESCRIPTION.—Root, "a small disc." "Fronds densely tufted, often inextricably tangled together at the base, from six to eight inches long or more, varying in diameter from the fineness of human hair to that of stout bristles," gradually tapering to a fine point, and everywhere beset with rather long slender capillary branches, which are very patent or divaricated. These are again similarly beset with short, very patent or recurved, mostly simple ramuli, all which taper to a fine point. These are frequently elongated into branchlets, and are in their turn beset with spine-like ramuli, which are sometimes again divided. Structure cellular ; cells large, roundish, quadrate. Substance rather flaccid, adhering closely to the paper. Colour, a fine transparent bright green, "becoming paler in drying."

A beautiful species, both in the growing state and under the microscope, but so different in its appearance under these circumstances, that one finds it difficult to believe that the two objects can be the same. In

the mass or when floating in its native pool, it is soft, silky, and confervoid, but when it is placed under the microscope it presents the appearance of a mass of thorny twigs, whose branches are everywhere covered with minute tapering spines, which give the whole an exceedingly rough and formidable appearance, while on the other hand the beautifully reticulated structure is an object of great beauty.

Although at first sight this species seems abundantly distinct from the preceding, yet there are said to be so many intermediate forms, that the best judges appear to have little hesitation in considering it a variety of that species, and certainly some forms we ourselves have seen appear sufficiently puzzling.

We have not met with the species in a growing state ourselves, and are unable to say whether it is found free or attached. Professor Harvey says, "Root a small disc," whilst Carmichael appears to describe it as free, "spreading over the sand" in the manner of some Confervæ. Perhaps all are at first attached, and only become free by the decay of the older parts, whilst the younger portions may continue to grow, even after being separated from their anchorage.



ENTEROMORPHA CLATHRATA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—*Enteromorpha clathrata*, one-fourth natural size.
2.—Portion of a branch.
3.—A ramulus. Both magnified.

Plate CCI.

ENTEROMORPHA RAMULOSA.—*Hook.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *ramulosa*.—"Frond subcompressed, highly reticulated, irregularly divided, the main divisions long, densely set with lateral branches; branches curved, curled or twisted, everywhere clothed with short, spine-like ramuli."—*Phyc. Brit.*

Enteromorpha *ramulosa*.—*Hook. Br. Fl.* vol. ii. p. 315; *Wyatt, Alg. Danm.* No. 208; *Harv. P. B.* plate 245; *Harv. Man.* p. 215; *Harv. Syn.* p. 183; *Atlas*, plate 71, fig. 334.

Enteromorpha *clathrata, γ uncinata*.—*Grev. Alg. Brit.* p. 181.

Ulva *ramulosa*.—*E. Bot.* t. 2137.

Ulva *uncinata*.—*Mohr, Cat. Alg.* fide *Ag.*

Hab.—On rocks, stones, &c., between tide-marks. Annual. Spring. Common.

Geogr. Dist.—Shores of Europe.

Description.—Root ——? Fronds densely tufted and inextricably interwoven and matted, six to eight inches or more in length; much branched, main divisions scarcely thicker than horse-hair, very long and cylindrical, waved, curled or twisted, attenuated at the apex to rather an obtuse point, everywhere beset with simple or compound, short, erect, patent or recurved ramuli, which often become elongated into branchlets, and are again ramulose. Structure loosely cellular, cells roundish oblong. Substance membranous, rather flaccid, and adhering but imperfectly to paper. Colour, a deep glossy green, not changing in drying.

A very beautiful species, and pretty distinct in habit, yet it will be seen how little there is in the diagnosis to distinguish it from its congeners.

When seen floating in water, so slender and delicate are even the main stems and branches, that it looks more like a species of *Cladophora* than of *Enteromorpha*, and is no doubt often passed by as such.

When young it has very much the appearance of *Cladophora arcta*, for

which we have at times mistaken it : but it soon becomes much more elongated than that plant, and of a deeper colour, by which it may be known even in the water, and when the water is squeezed out of it, the bristly squarrose habit will in general readily distinguish it. Under the microscope there is no chance of confusion.

From the last species, however, *E. clathrata*, we must confess that it is not at all times so easily distinguished ; and even its most characteristic forms, we much fear, can only be considered a variety, if even a good one, of that species.

EXPLANATION OF PLATE CCI.

Fig. 1.—*Enteromorpha ramulosa*, natural size.
2.—Branch.
3.—Portion of stem. Both magnified.

ENTEROMORPHA ramulosa. Hook.

Nature Printed by Henry Bradbury.

ENTEROMORPHA HOPKIRKII.—*M'Calla.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *Hopkirkii.*—"Fronds excessively slender and byssoid, flaccid, very much branched; branches feathery, decompound, erect, attenuated, set with minute, subulate ramuli; cellules large, hyaline, each cell containing one or two minute grains of endochrome, the ramuli composed of a single series of such cellules."—*Phyc. Brit.*

Enteromorpha *Hopkirkii.*—*M'Calla, Alg. Hib.* ined.; *Harv. P. B.* plate 263; *Harv. Man.* p. 215; *Harv. Syn.* p. 183; *Atlas*, plate 71, fig. 334.

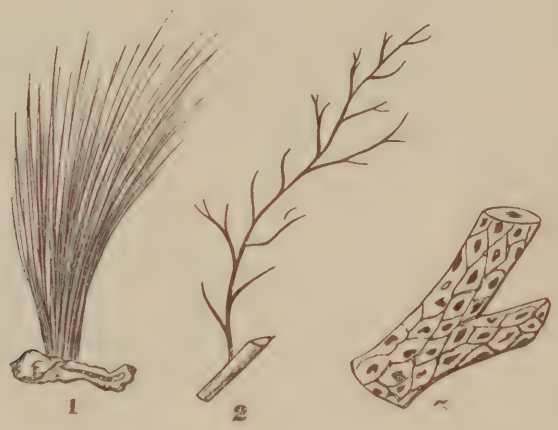
Hab.—Dredged in four to ten fathoms water. Annual. Summer and autumn. Goodrington, Torbay (*Mrs. Griffiths*, 1838); Carrickfergus (*Mr. M'Calla*, 1845).—*Phyc. Brit.*

Geogr. Dist. —— ?

Description.—Root —— ? Fronds densely tufted or cæspitose, from six inches to a foot or more in length, excessively slender and capillary, scarcely so thick as the finest hair. Branches scattered, alternate or occasionally opposite, erecto-patent, straight or slightly waved, very long, and rather more slender than the stems or primary branches; again repeatedly divided in a similar manner; the ultimate ramuli setaceous, short, very slender, simple or compound, tapering to an acute point, often consisting of a single series of cells. These are very large, translucent, containing each a small bright green speck of endochrome. Substance very flaccid, and closely adhering to the paper in drying. Colour, a rather pale but bright and pleasant green, not changing much in drying.

In a genus such as the present, *E. Hopkirkii* will not, we conceive, be the first to yield its title to rank as a species, however unsatisfactory may be its characters. The extreme delicacy of its fronds, the great laxness of its structure, the minute grain of endochrome in the very large hyaline cells, the suberect branches and ramuli—all more or less furnish us with characters not at all, under ordinary circumstances, of great difficulty to recognise; yet we much fear, however we may regret it, on account of the beauty of the plant, that, should its relatives once more become absorbed into the essence of their primary, this form can hardly stand its

ground, or be able to maintain specific existence. We say, for the sake of the beauty of the plant : we would also add, for the sake of the name or rather names with which it has been associated ; for although the names of Mr. Hopkirk and M'Calla are too "well known to fame" to require any association with a sea-weed to enhance their reputation, yet we would be sorry to see them lose even the shadow of honour by the mergence of the present species or form into that of any other of its congeners.



ENTEROMORPHA HOPKIRKII.

Fig. 1.—*Enteromorpha Hopkirkii*, tuft, natural size.
2.—Branch, magnified.
3.—Portion of same, greatly magnified.

ENTEROMORPHA PERCURSA.—*Hook.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφή, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *percursa*.—"Frond capillary, entangled, and variously twisted, simple or having a few short spine-like ramuli, compressed, solid (?), reticulated; cells quadrate, two or more (generally two), in the breadth of the frond, the endochrome nearly filling the cell."—*Phyc. Brit.*

Enteromorpha *percursa*.—*Hook. Br. Fl.* vol. ii. p. 315; *Harv. P. B.* plate 352; *Harv. Man.* 1st edit. p. 176; *Harv. Syn.* p. 184; *Atlas*, plate 72, fig. 340.

Solenia *percursa*.—*Ag. Syst. Alg.* p. 187.

Scytosiphon *compressus*, γ *confervoideus*.—*Lyngb. Hyd. Dan.* p. 65, t. 15, f. B, 4—6.

Hab.—Muddy sea-shores at half-tide level. Annual. Spring and summer. Not uncommon.

Geogr. Dist.—Shores of Europe.

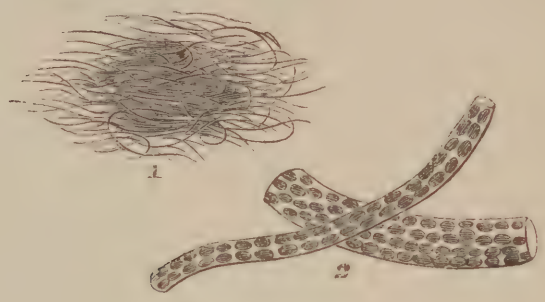
Description.—Fronds decumbent or floating, free (?), "forming widely spreading, entangled strata," or mixed up with other confervoid Algæ, extremely slender and filiform, subcompressed, simple, or, in the larger filaments, with here and there a simple filiform branchlet of extreme tenuity, formed, like the other filaments, of a double row of cells, the larger being composed of several rows. Cells large, subquadrate, hyaline, but nearly filled with a bright green endochrome. Substance rather flaccid and adhering to the paper in drying. Colour, a bright green, well preserved in drying.

This very pretty species or form we have never met with either in a growing state, or in isolated tufts or strata, but always mixed up with other confervoid Algæ, or forming strata in tide-pools, and under these circumstances generally in small quantities, but exactly agreeing with the figure and description in *Phyc. Brit.* We are therefore unable to say whether the plants so found have been attached in their earlier stage or not; we are rather inclined to think they have, and only become detached by age; but further observation is necessary to decide the point.

The species is readily known from all the preceding by its simple, or

nearly simple filaments, most of them consisting of only a double row of cells, the endochrome almost entirely filling the cell.

The plant is perhaps not uncommon on most of our coasts, and should be looked for on muddy sea-shores, between tides, or in pools subject to the influence of the tide.



ENTEROMORPHA PERCURSA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Enteromorpha percursa*, tuft, natural size.
2.—Portion of same, greatly magnified.

ENTEROMORPHA RALFSII.—*Harv.*

Gen. Char.—Fronds membranous, tubular, reticulated. Fructification: consisting of granules contained in cells of the frond, and generally quaternate or arranged in fours. Name from ἔντερον, "an entrail," and μορφὴ, "form," referring to the puckered and inflated tubes of some of the species.

Enteromorpha *Ralfsii.*—"Frond capillary, simple, or having a few short, spine-like ramuli, nearly solid, laxly reticulated; the cells large, hyaline (two to four in the breadth of the frond), each cell containing a brilliant green grain of endochrome."—*Phyc. Brit.*

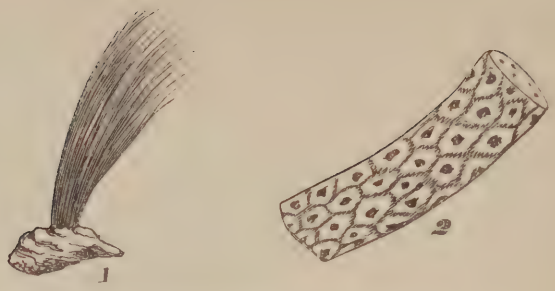
Enteromorpha *Ralfsii.*—*Harv. P. B.* plate 282; *Harv. Man.* p. 215, as *E. percursa; Harv. Syn.* p. 184; *Atlas*, plate 72, fig. 341.

Hab.—On the oozy sea-shore, above half-tide level, spreading widely. Annual. Summer. Bangor, N. Wales, &c. (*Mr. Ralfs*).—*Phyc. Brit.*

Geogr. Dist. —— ?

Description.—"Fronds many inches long, exceedingly slender, varying from less than the diameter of a human hair to nearly that of horse-hair, densely aggregated, decumbent, and spreading in wide continuous strata, which cover any object they encounter. Each frond is simple, unbranched, or rarely having a few short, spine-like ramuli scattered here and there; it is curled or flexuous, and sometimes the fronds are so much rolled together and bundled, that it is difficult to disentangle them. The cells of which the frond is composed are remarkably large, sometimes two, sometimes four, forming the breadth of the filament; each cell is hyaline, glossy, somewhat distended, and contains a bright green grain of endochrome in its centre. I have not observed any fructification."—*Phyc. Brit.*

The greater number of cells in the breadth of the frond, the larger rounder cells, and the minute speck of endochrome in each, appear to be the only characters to distinguish this species from the preceding.



ENTEROMORPHA RALFSII.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—*Enteromorpha Ralfsii*, tuft, natural size.
2.—Portion of same, greatly magnified.

Plate CCII.

ULVA LATISSIMA.—*Linn.*

Gen. Char.—Fronds cellular, membranaceous, plane (in some, saccate and inflated when young). Fructification: minute granules, often arranged in fours, immersed in the surface of the frond. Name supposed to be from *ul*, "water," in Celtic.

Ulva *latissima*.—Fronds roundish oblong, or broadly ovate or obovate; margins waved, often cut or laciniated.

Ulva *latissima*.—*Linn. Fl. Suec.* p. 433; *Ag. Sp. Alg.* vol. i. p. 407; *Ag. Syst.* p. 188; *Grev. Alg. Brit.* p. 171; *Hook. Br. Fl.* vol. ii. p. 311; *Wyatt, Alg. Danm.* No. 33; *J. Ag. Alg. Medit.* p. 17; *Kütz. Phyc. Gen.* p. 296; *Mont. Fl. Ang.* p. 149; *Endl.* 3rd Suppl. p. 19; *Harv.* in *Mack. Fl. Hib.* part 3, p. 242; *Harv. P. B.* plate 171; *Harv. Man.* p. 216; *Harv. Syn.* p. 185; *Atlas*, plate 73, fig. 342; *Harv. N. B. A.* part 3, p. 59.

Ulva *lactuca*, var. *latissima*.—*Lightf. Fl. Scot.* p. 971.

Ulva *lactuca*.—*E. Bot.* t. 1551 (not of *Linn.*).

Hab.—On rocks, stones, &c., from between tide-mark to fifteen fathoms water. Annual. Summer and autumn. Everywhere common.

Geogr. Dist.—Throughout the ocean, even to the limits of vegetation in both hemispheres.

Description.—Root, a minute spreading disc. Fronds tufted, flat, sessile, from six inches to a foot or more in length, and from five to six or more in breadth, generally from a broad rounded or cordate base, broadly ovate, oblong, or somewhat obovate, the apex more or less rounded and obtuse; the margin waved, crisped, and plaited, often cut or more or less laciniated or crenated. Structure consisting of two strata of minute coloured cellules, only partially separated from each other by a very thin almost colourless stratum. Substance very thin, membranous, rather firm, scarcely adhering to paper in drying. Colour, a fine deep green, often, especially in old plants, changing to a brownish black when dry.

This species is no less abundantly than extensively distributed, being common on all our shores, as well as on every other from the Arctic to the Antarctic seas. We have seen specimens from as high a latitude as 74° N., and it is said to extend nearly as far in the opposite direction. It is, moreover, one of those plants about which there can be but little

chance of doubt or uncertainty, as it exhibits its general character unchanged, with but slight variation, in every variety of climate and of sea.

When young and fresh, it is a beautiful species, but when old, it becomes coarse in substance and in colour; being a favourite food with many species of marine animals, it is soon perforated in every direction, and presents, in its tattered and torn old age, the veriest contrast to the beauty and freshness of its youthful days.

Unless gathered when young, the fronds are very apt to change their colour to an olive or brownish black in drying, and that with whatever care they may be tended.

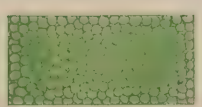
It is, perhaps, the most beautiful as well as the most valuable of all the green sea-weeds for the aquarium, as it grows freely without exhibiting those exterminating properties for which some of the other species are so notorious.

EXPLANATION OF PLATE CCII.

Fig. 1.—*Ulva latissima*, natural size.
2.—Surface cells.
3.—Vertical section. Both magnified.

1

3



2

Utricularia latissima R.Br.

Lithog. printed by Henry Bradbury

Plate CCIII.

ULVA LACTUCA.—*Linn.*

Gen. Char.—Fronds cellular, membranaceous, plane (in some, saccate and inflated when young). Fructification: minute granules, often arranged in fours, immersed in the surface of the frond. Name supposed to be from *ul*, "water," in Celtic.

Ulva *Lactuca.*—Frond obovate or pyriform, inflated, nearly sessile, at length more or less cleft or laciniated.

Ulva *Lactuca.*—*Linn. Sp. Plan.* p. 1632; *Lightf. Fl. Scot.* p. 970; *Ag. Sp. Alg.* vol. i. p. 409; *Ag. Syst.* p. 189; *Lyngb. Hyd. Dan.* p. 30, in part; *Grev. Crypt. Scot.* t. 313; *Grev. Alg. Brit.* p. 172; *Hook. Br. Fl.* vol. ii. p. 311; *Harv. P. B.* plate 243; *Harv. Man.* p. 216; *Harv. Syn.* p. 185; *Atlas*, plate 73, fig. 343; *Harv. N. B. A.* part 3, p. 60.

Hab.—On rocks, stones, shells, &c., between tide-marks. Annual. May and June. All round the British coasts.

Geogr. Dist.—Shores of Europe and Atlantic shores of North America.

Description.—Root, a minute disc. Fronds tufted, two to four inches or more in length, sessile, or with a scarcely evident stem, obovate or pyriform, inflated, at length bursting at the summit, and becoming more or less cleft, often down to the base, into numerous broad, entire, jagged, or laciniated segments; the whole then forming a flat membrane of a very thin and delicate structure, composed of minute roundish oblong cells, arranged in fours, and filled with a pale yellow endochrome, the rest of the membrane being nearly colourless. Substance rather flaccid, and adhering closely to the paper. Colour, a pale yellowish green, but not changing in drying.

This species has been often confounded with the last, from which it may be readily distinguished in the young state by the obovate inflated frond, and when old by the paler colour, more flaccid substance, and by the quaternate arrangement of the cellules. It is much less abundant, as well as much less generally distributed than the preceding, but being an "early riser," or spring plant, is no doubt often missed by collectors whose explorations are mostly confined to the sunny months of summer. It seems to prefer shallower water than the last species, and is usually found in shallow weedy pools above half-tide level, or on a shelving

gravelly shore, where it is generally found parasitical on the smaller Algæ, such as *Dumontia filiformis* and *Laurencia pinnatifida*. It makes its appearance about April, and by the end of June has generally disappeared.

EXPLANATION OF PLATE CCIII.

Fig. 1.—*Ulva Lactuca*, natural size.
2.—Surface cells.
3.—Vertical section. Both magnified.

Lactuca lactuca. Linn.

Nature Printed by Henry Bradbury.

Plate CCIV.

ULVA LINZA.—*Linn.*

Gen. Char.—Fronds cellular, membranaceous, plane (in some, saccate and inflated when young). Fructification: minute granules, often arranged in fours, immersed in the surface of the frond. Name supposed to be from *ul*, "water," in Celtic.

Ulva *Linza*.—Frond linear-lanceolate, tapering upwards into an obtuse point, and at the base into an imperfect stem; margin entire or only but slightly waved or crenate, much crisped and plaited.

Ulva *Linza*.—*Linn. Sp. Plan.* p. 1633; *Lightf. Fl. Scot.* p. 973; *Fl. Dan.* t. 889; *Roth, Cat.* vol. ii. p. 246, and vol. iii. p. 330; *Ag. Syn.* p. 40; *Spec. Alg.* vol. i. p. 413; *Lyngb. Hyd. Dan.* p. 32; *Grev. Fl. Edin.* p. 299; *Alg. Brit.* p. 173; *Hook. Br. Fl.* vol. ii. p. 311; *Wyatt, Alg. Danm.* No. 164; *J. Ag. Alg. Medit.* p. 17; *Harv.* in *Mack. Fl. Hib.* part 3, p. 243; *Harv. P. B.* plate 39; *Harv. Man.* p. 216; *Harv. Syn.* p. 186; *Atlas,* plate 73, fig. 344; *Harv. N. B. A.* part 3, p. 59.

Solenia *Linza*.—*Ag. Syst.* p. 185.

Phycoseris *Linza*.—*Kütz. Phyc. Gen.* p. 297.

Tremella *marina fasciata*.—*Dill. Musc.* p. 46, t. 9, f. 6.

Hab.—On rocks, stones, shells, &c., in the sea, between tide-marks. Annual. Summer. Common.

Geogr. Dist.—Atlantic and Mediterranean shores of Europe; Atlantic shores of North America; New Zealand.

Description.—Root, a small conical disc. Fronds flat, linear-lanceolate, eight to sixteen inches in length, gradually tapering at the base into an imperfect stem, which is subcylindrical at the base, but becomes gradually compressed and flattened upwards for a space of one or two inches till lost in the frond, which again gradually tapers upwards into an obtuse point; margin entire or slightly sinuated here and there, and much and beautifully crisped or plaited. Structure consisting of two strata of minute roundish cells filled with pale green endochrome. Substance, when young, somewhat flaccid, and slightly adhering to paper: and the colour a yellowish but lively and pleasant green, well preserved in drying; when old, the substance is more rigid, not at all adhering to paper, changing to a dark, dull greenish yellow in drying.

A beautiful species, whether viewed in the herbarium or in its own native rock-pool, yielding to none perhaps either in delicacy or beauty. With us it seems to choose deep, quiet pools near low water, where it prefers the isolated stones, which it completely covers, the delicate fronds hanging down gracefully on all sides, or gently waving in the rising swell. So delicate are the fronds, and so closely smoothed down one over the other, that we have sometimes had a difficulty in distinguishing it, without a nearer inspection, from some forms of *Enteromorpha* with which it was associated, and which presented almost a similar habit. A plant of summer hues, it seldom survives its sunny days, and by the end of August has mostly disappeared, and its place occupied by *Chorda filium*, *Chordaria flagelliformis*, *Dictyosiphon fæniculaceus*, and other plants of sombre hues. When old the specimens almost invariably become more or less brown in drying, however fresh they may look when gathered, or whatever care may be bestowed upon them.

EXPLANATION OF PLATE CCIV.

Fig. 1.—*Ulva Linza*, natural size.
2.—Surface cells.
3.—Vertical section. Both magnified.

Ulva Linza. Linn.

Nature Printed by Henry Bradbury.

Plate CCV.

PORPHYRA LACINIATA.—*Ag.*

Gen. Char.—Frond membranous, very thin, flat, purple or brownish purple. Fructification: cruciate tetraspores arranged in fours, occupying the whole surface of the frond, and "scattered sori of oval spores."—*Grev.* Name from *πορφύρος*, "purple," alluding to the colour of the frond.

Porphyra *laciniata*.—Frond roundish or broadly oval, obtuse, more or less deeply and irregularly cleft into broad segments; margins much crisped and plaited.

Porphyra *laciniata*.—*Ag. Syst.* p. 190; *Ag. Ic. Alg. Eur.* t. 26, 27; *Grev. Alg. Brit.* p. 168; *Hook. Br. Fl.* vol. ii. p. 310; *Wyatt, Alg. Danm.* No. 32; *Endl.* 3rd Suppl. p. 19; *Kütz. Phyc. Gen.* p. 383; *Harv.* in *Mack. Fl. Hib.* part 3, p. 241; *Harv. P. B.* plate 92; *Harv. Man.* p. 216; *Harv. Syn.* p. 186; *Atlas*, plate 73, fig. 345; *Harv. N. B. A.* part 3, p. 53.

Porphyra *umbilicalis*.—*Kütz. Phyc. Gen.* p. 383.

Ulva *laciniata*.—*Lightf. Fl. Scot.* p. 974, t. 33; *Roth, Fl. Germ.* p. 585; *Ag. Sp. Alg.* vol. i. p. 404.

Ulva *umbilicalis*.—*E. Bot.* t. 2286; *Lyngb. Hyd. Dan.* p. 28.

Hab.—On rocks within range of tide. Annual. Spring to autumn. Common.

Geogr. Dist.—Throughout the Atlantic Ocean, from the Faroe Isles to the Cape of Good Hope.

Description.—Root, a minute flat disc. Fronds tufted, six to ten inches long or more, roundish, entire, and nearly flat when young, broadly ovate, and more or less divided into broad obtuse lobes, the margins becoming eventually very much waved and plaited, base rounded, cordate, or peltate; when young, the stem is always more or less evident, but very short; when old, it is scarcely apparent. Structure cellular, cells very lax, and almost colourless, at length nearly filled with purplish endochrome, which becomes condensed into granules, and these are mostly arranged, but very irregularly, in fours; in thickness the frond is very irregular, sometimes containing only a single series of cells, at other times, four or even five. Substance always delicately membranous, but very rigid when dry, shrinking greatly, and not adhering to the paper. Colour very variable, from a pale purplish brown to a dark purple, generally with a bright metallic lustre when dry.

This species is no less common than variable and puzzling. When young its outline is more or less round or roundish ovate or subreniform, but when old it is always very irregular, and more or less cut or laciniated, but this cutting commences at no particular period of its growth as we have specimens now before us scarcely a quarter of an inch in diameter, and divided nearly half-way, while others are nearly four inches, and still quite entire.

These specimens have all a more or less evident stem, but as this remains stationary whilst the frond becomes vastly expanded, the former is scarcely observable when compared with the great dimensions of the latter, and will readily escape detection, unless looked for with some care.

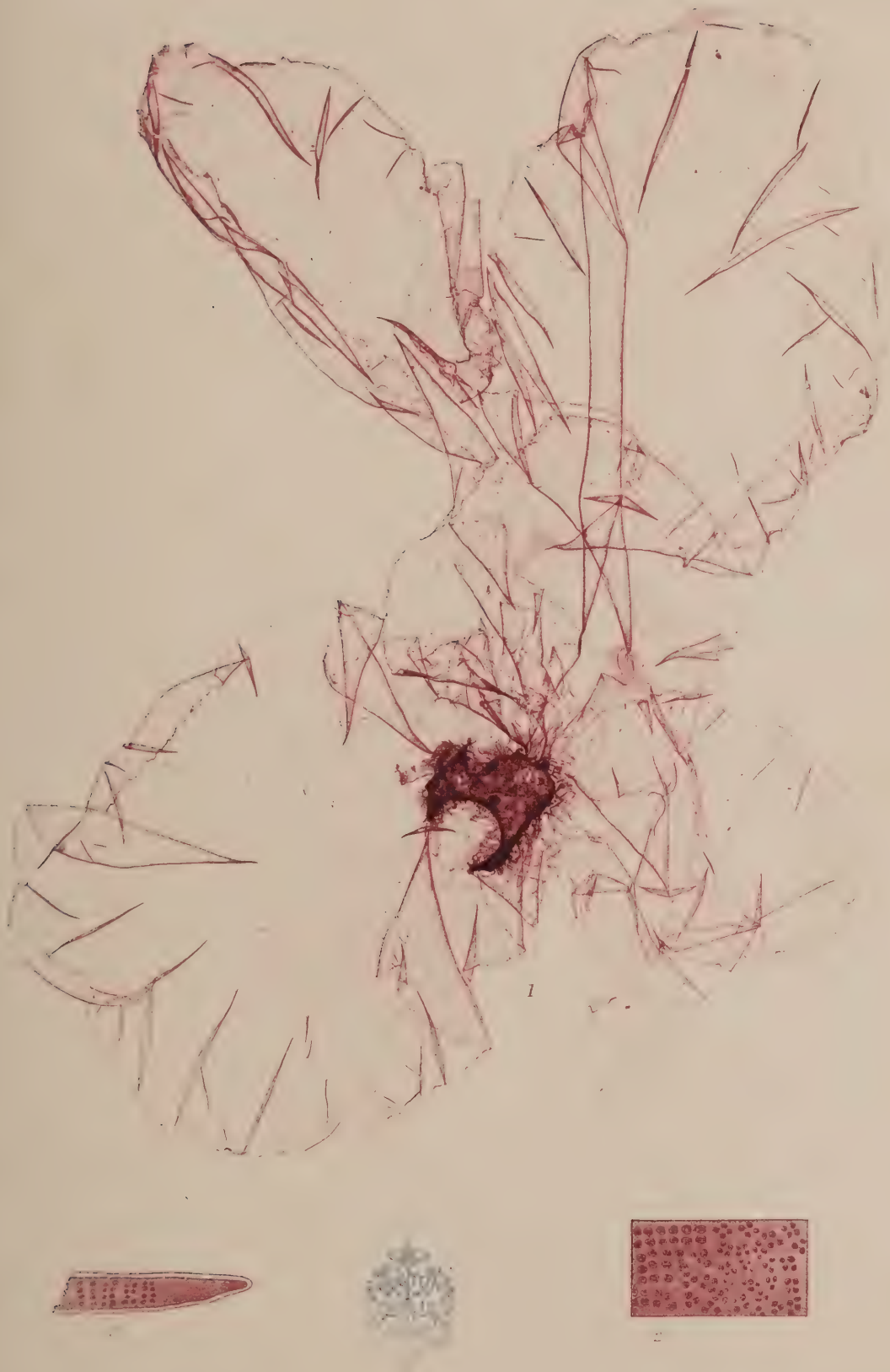
In its duration the plant is generally considered annual, but specimens may be found at all seasons.

It generally selects low flat rocks between tides, and such as are uncovered for some time during each returning tide; we have very rarely met with it in pools or below low-water mark. It is generally attached to rocks, but we find a very pretty brown form here (near Montrose) parasitical on various Algæ, but it seems more evanescent in its appearance than any of the other varieties that we have seen.

Roundish or oval spores, of very irregular sizes, are not unfrequent on this species. They are arranged in a very irregular, often almost interrupted band within the margin, sometimes forming pretty large groups; at other times there are only a few scattered here and there.

EXPLANATION OF PLATE CCV.

Fig. 1.—*Porphyra laciniata*, natural size.
2.—Surface.
3.—Vertical section. Both magnified.



PORPHY'RA luciniata. Ag.

Printed by Henry Bradbury.

Plate CCVI.

PORPHYRA VULGARIS.—*Ag.*

Gen. Char.—Frond membranous, very thin, flat, purple or brownish purple. Fructification: cruciate tetraspores, arranged in fours, occupying the whole surface of the frond, and "scattered sori of oval spores."—*Grev.* Name from πορφύρος, "purple," alluding to the colour of the frond.

Porphyra *vulgaris*.—Frond lanceolate or linear-lanceolate, quite entire, often contracted at the base.

Porphyra *vulgaris*.—*Ag. Aufz.* p. 18; *Grev. Alg. Brit.* p. 169; *Hook. Br. Fl.* vol. ii. p. 310; *Wyatt, Alg. Danm.* No. 32; *Hook. fil. Fl. Antarct.* vol. ii. p. 500; *Kütz. Phyc. Gen.* p. 382; *Endl.* 3rd Suppl. p. 19; *Harv.* in *Mack. Fl. Hib.* part 3, p. 241; *Harv. P. B.* plate 211; *Harv. Man.* p. 217; *Harv. Syn.* p. 187; *Atlas*, plate 74, fig. 346; *Harv. N. B. A.* part 3, p. 53.

Porphyra *purpurea*.—*Ag. Syst. Alg.* p. 191.

Var. β. *linearis*.—Fronds small, linear or linear-lanceolate, very thin and delicate.

Porphyra *linearis*.—*Grev. Alg. Brit.* p. 170, t. 18; *Hook. Br. Fl.* vol. ii. p. 310; *Harv.* in *Mack. Fl. Hib.* part 3, p. 241; *Harv. Man.* 1st edit. p. 170; *Wyatt, Alg. Danm.* No. 163; *Endl.* 3rd Suppl. p. 19.

Ulva *purpurea*.—*Roth, Cat. Bot.* vol. i. p. 209, t. 6; *Lyngb. Hyd. Dan.* p. 29; *Ag. Sp. Alg.* vol. i. p. 405.

Hab.—On rocks and stones between tide-marks. Annual. To be found most of the year. Common.

Geogr. Dist.—Throughout the Atlantic Ocean, from the Faroe Isles to Cape Horn. Kerguelen's Land.

Description.—Root, a minute disc. Fronds almost sessile, ten to sixteen inches or more in length, and from one and a-half to two and a-half inches in breadth, the base rounder or cordate, generally broad, sometimes much contracted, and then expanding into an elongate, lanceolate, or linear-lanceolate frond, the upper part gradually tapering into an obtuse point; margins beautifully waved or plaited, quite entire. Stem in the young plant quite apparent, but very short, in the old almost obliterated. Structure consists of one or more, generally four, series or strata of lax cells, at length filled with purple granules, mostly arranged in fours. Substance delicately membranous but rigid, contracting much

in drying, and not adhering to paper, except the younger parts round the margin. Colour, a fine purplish brown when young ; when old and full of fruit, a more or less deep brownish purple.

This beautiful species is apparently as common as the last, but, we are sorry to say, equally inconstant to its characters. This is not to be wondered at in plants so much exposed to be influenced by tides, currents, and exposure, and at the same time so thin and delicate that it is difficult to obtain a specimen perfectly free from laceration ; add to this, that the plant seems a favourite food for most of the marine molluscs, and becomes at a very early age perforated in all directions by their nibblings. Under these circumstances, it will always be difficult to decide whether this and the preceding be really distinct, or only forms of the same variable species. A careful study of the two in their native habitats can alone decide the question.

Not less difficult is it to decide the fate of *P. linearis*. When we first met with this, we did not in the least doubt its being a distinct species, the beautiful brownish orange colour, its peculiar habitat, fringing the pools among the rocks near high-water mark, or the little oozy rills that issue from them, the lowest fronds only spreading their neatly frilled or crisped margins on the water, appeared so characteristic, that we could not for a moment confound it with the coarse, dark-coloured plants in the pools below. Since then, however, we must confess that our ideas have been somewhat modified. Certainty has given place to doubt, and doubt itself is, we fear, gradually yielding to certainty, or at least to a suspicion, that our favourite little gem may after all be only a variety.

Numerous specimens now before us, collected in various localities, have induced this suspicion, yet we think further and very careful observation is necessary before we can come to a decision. This, however, does not prevent others from deciding ; they may be satisfied though we are not.

It ought not to be forgotten that *P. linearis* is a winter species, making its appearance in October, reaching its perfection in spring, and wholly disappearing in early summer.

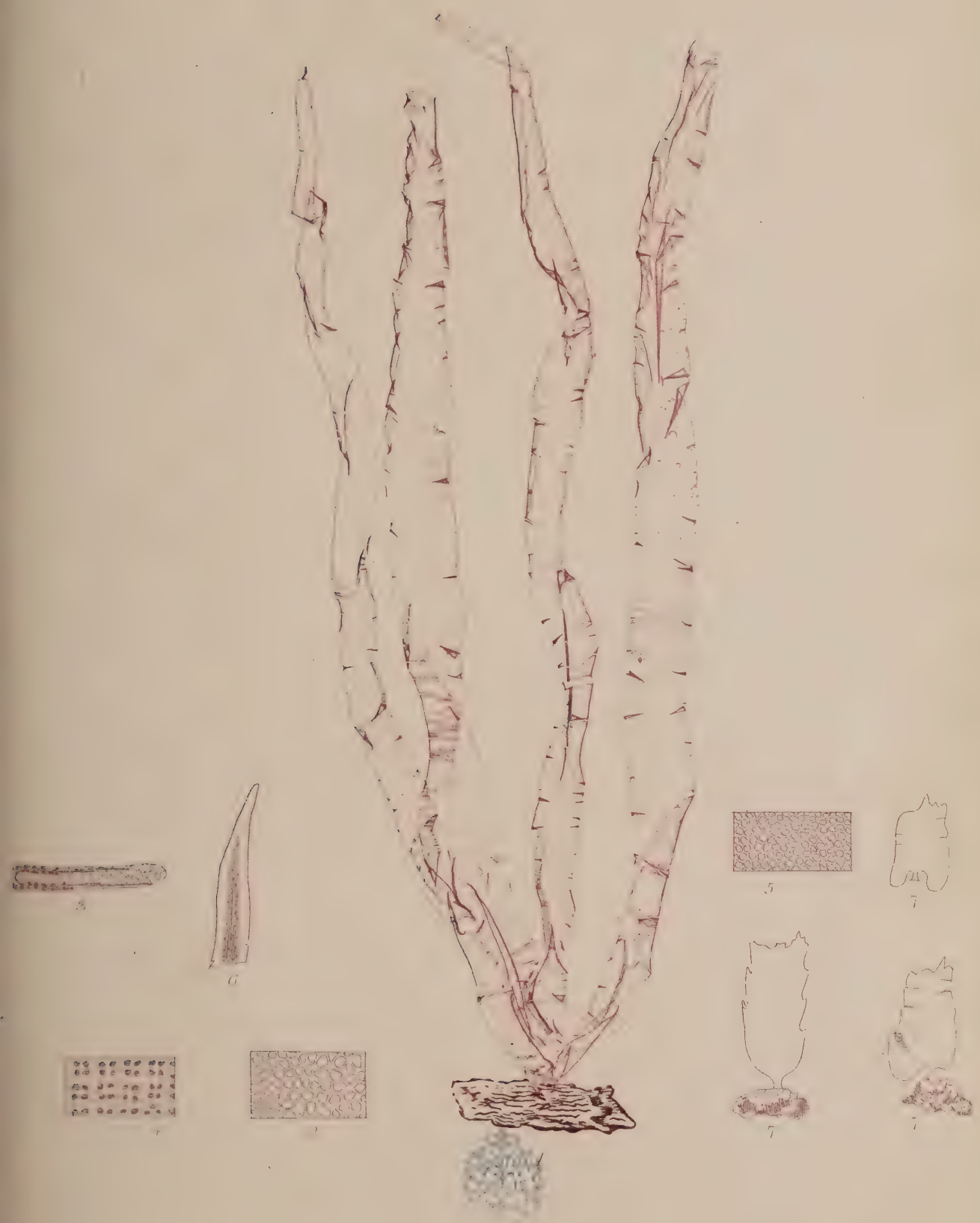
We have never seen fresh specimens without having the margins more or less waved, indeed, the fronds, from their narrowness and the fulness of the margins, generally twist themselves into a spiral ; this character, however, is generally lost in the drying, and the margins then appear quite plain.

The cells in the younger parts, that is, along the upper margins and at the apex, are generally colourless or but very faintly coloured, and the frond is then somewhat thickened in the middle.

We are unable to say that we find in the present a more evident stem or a more rounded base than in any of the others: in all these characters are most visible in the young state.

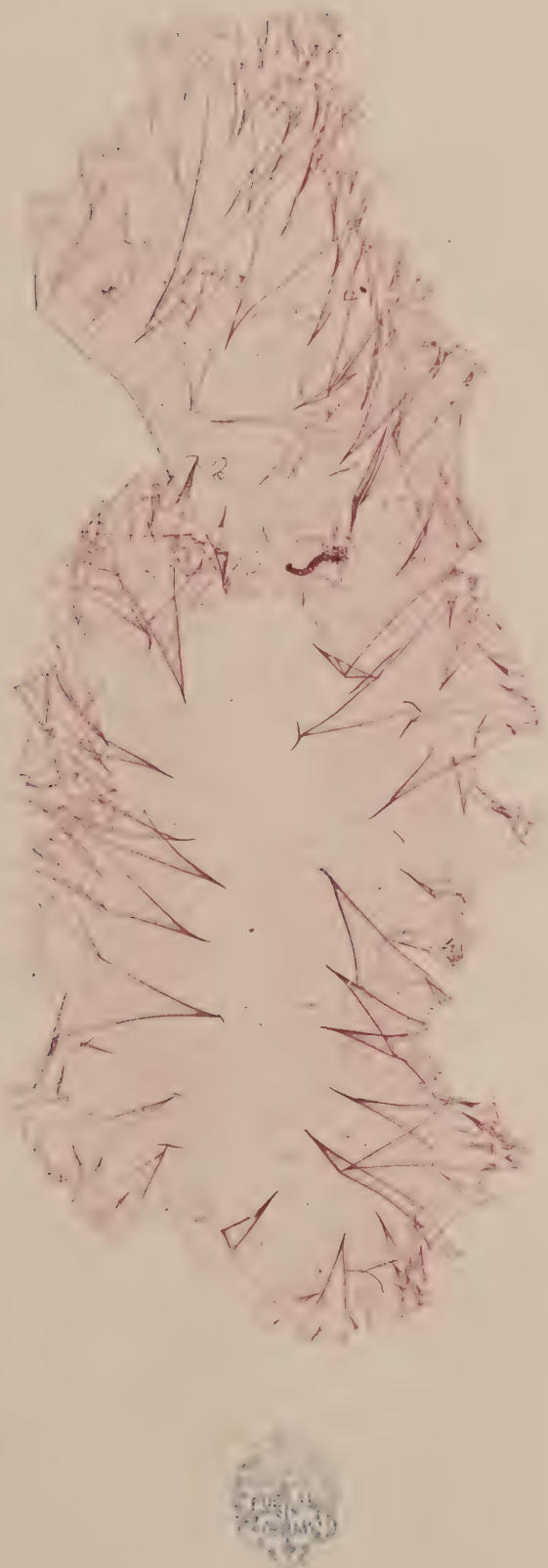
EXPLANATION OF PLATE CCVI.

Fig. 1.—*Porphyra vulgaris*, natural size.
2.—Surface cells.
3.—Vertical section in fruit.
4.—Surface with fruit.
5.—Surface cells of *P. linearis*.
6.—Apex of same.
7.—Various forms of the base of same. All magnified.



PORPHYRA vulgaris. Hd.

Nature Printed by Henry Lindsay



Porphyra vulgaris. 1a

BANGIA FUSCO-PURPUREA.—*Lyngb.*

Gen. Char.—Frond cellular, "filiform, tubular, composed of numerous radiating cellules, disposed in transverse rows, and enclosed within a hyaline continuous sheath; spores purple or green, formed within each of the cells of the frond."—*Phyc. Brit.* Name in honour of Hoffman Bang, a Danish botanist, who wrote a work on the use of the *Confervæ* in the economy of nature.

Bangia *fusco-purpurea.*—Fronds attached, simple, here and there constricted, almost hyaline; granules dark purple.

Bangia *fusco-purpurea.*—*Lyngb. Hyd. Dan.* p. 83, t. 24; *Grev. Fl. Edin.* p. 302; *Spreng. Syst. Veg.* vol. iv. p. 361; *Grev. Alg. Brit.* p. 177; *Hook. Brit. Fl.* vol. ii. p. 316; *Wyatt, Alg. Danm.* No. 167; *J. Ag. Alg. Medit.* p. 14; *Kütz. Phyc. Gen.* p. 249; *Chauv. Mèm. sur Bangia, Recherches,* p. 35; *Harv.* in *Mack. Fl. Hib.* part 3, p. 241; *Harv. P. B.* plate 96; *Harv. Man.* p. 217; *Atlas,* plate 74, fig. 346; *Harv. N. B. A.* part 3, p. 54.

Bangia *atro-purpurea.*—*Ag. Syst.* p. 76; *Ag. Ic. Alg. Eur.* t. 25; *Endl.* 3rd Suppl. p. 18; *Kütz. Phyc. Gen.* p. 250.

Bangia *versicolor.*—*Kütz.* l. c. p. 250, t. 45, f. 3.

Conferva *fusco-purpurea.*—*Dillw. Conf.* t. 92; *E. Bot.* t. 2055.

Conferva *atro-purpurea.*—*Roth, Cat. Bot.* vol. iii. p. 208, t. 6; *Dillw. Conf.* t. 103; *E. Bot.* t. 2085.

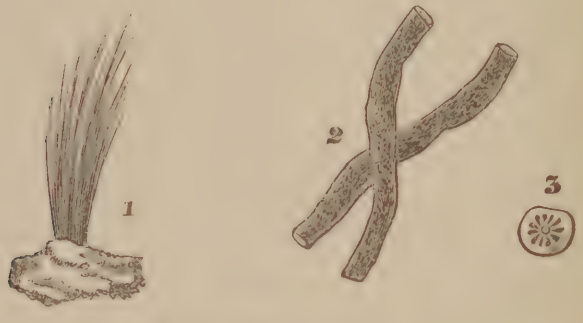
Hab.—On rocks, &c., in the sea, within tide-range; sometimes growing in fresh water rivers and canals. Common on the shores of England and Ireland; rather uncommon in Scotland; Jersey.

Geogr. Dist.—Atlantic shores of Europe, from Faroe Isles to France; Mediterranean Sea; Atlantic shores of North America.

Description.—Root, a minute disc. Fronds densely cæspitose, forming extensive patches, two to four inches in length, and scarcely so stout as wool, but very variable in thickness, consisting of a continuous tube filled with vertical radiating series of obovate cells ranged round a minute central tube, the circular series of cellules being packed or piled one above another somewhat loosely in the tube; the endochrome in each cellule being eventually condensed into a spore, of a dark purple colour. Substance very flaccid and elastic, closely adhering to paper in drying.

The favourite habitat of this curious plant is the hard smooth rocks, which have been polished almost as smooth as the surface of a mirror by

the sweep of the surge for innumerable ages. These favourite localities being generally situated near high-water mark, a few washes at each flood seems quite sufficient to keep the plant in growing health, although during the rest of the time it is generally completely dried up by the sun, yet no sooner is a little water thrown over the plant than it again in a few seconds resumes its wonted freshness and elasticity. This elasticity is very remarkable, and greatly exceeding that of any other vegetable substance with which we are acquainted, India-rubber excepted, and this elasticity appears to extend to its vitality as well as to its substance, the one perhaps being in some measure the result of the other. We have never seen it growing, except in the above-mentioned localities, and it is not scarce on the eastern coast of Scotland, wherever the rocks offer a surface sufficiently smooth for its growth. We have not seen fresh water specimens.



BANGIA FUSCO-PURPUREA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Plants, natural size.
2.—Portion of same.
3.—Transverse section of a filament. Both magnified.

BANGIA CILIARIS.—*Carm.*

Gen. Char.—Frond cellular, "filiform, tubular, composed of numerous radiating cellules, disposed in transverse rows, and inclosed within a hyaline continuous sheath; spores purple or green, formed within each of the cells of the frond."—*Phyc. Brit.* Name in honour of Hoffman Bang, a Danish botanist, who wrote a work on the use of the *Confervæ* in the economy of nature.

Bangia *ciliaris.*—"Filaments gregarious, very minute, simple, straight, compressed, purple; grains two or three in each transverse band, globose, sometimes solitary."—*Phyc. Brit.*

Bangia *ciliaris.*—*Carm. MSS. Hook. Br. Fl.* vol. ii. p. 316; *Chauv. Recherches*, p. 37; *Harv. P. B.* plate 322; *Harv. Man.* p. 218; *Harv. Syn.* p. 187; *Atlas*, plate 74, fig. 348; *Harv. N. B. A.* part 3, p. 56.

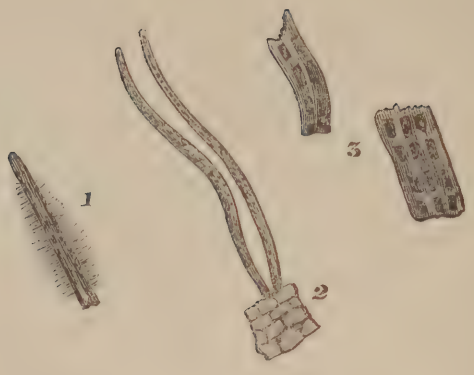
Goniotrichum *ceramicola*, var. *a. simplex?*—*Kütz. Sp. Alg.* p. 358.

Hab.—On old leaves of *Zostera marina.* Annual. Spring. Appin (*Capt. Carmichael*).

Geogr. Dist.—Shores of Scotland and North of France; Atlantic shores of North America.

Description.—"Filaments gregarious, about half a line in length, fringing the leaves of *Zostera* in narrow patches, one or more inches in length; each little thread is erect, straight, or slightly curved, variable in diameter, sometimes containing but a single series or row of granules, oftener containing a double row, and now and then a triple row. All these variations of structure sometimes occur in the same plant, in which case one portion is broader than another, and usually it is the middle portion which is distended. The granules are rounded, somewhat depressed at the poles, and of a brilliant purple colour."—*Phyc. Brit.*

We have not seen this species, although it is presumed by Professor Harvey to be not uncommon.



BANGIA CILIARIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Plants of *Bangia cillaris*, on *Zostera*, natural size.
2.—Same.
3.—Portion of same. Both magnified.
(Reduced from *Phyc. Brit.*)

BANGIA CERAMICOLA.—*Chauv.*

Gen. Char.—Frond cellular, "filiform, tubular, composed of numerous radiating cellules, disposed in transverse rows, and enclosed within a hyaline continuous sheath; spores purple or green, formed within each of the cells of the frond."—*Phyc. Brit.* Name in honour of Hoffman Bang, a Danish botanist, who wrote a work on the use of the *Confervæ* in the economy of nature.

Bangia *ceramicola*.—Filaments articulated; articulations very unequal, once or twice as long as broad, longitudinally striate, "endochrome at length globular, and escaping through the tube."—*Carmichael* in *Hook. Brit. Fl.* p. 355.

Bangia *ceramicola*.—*Chauv. Recherches*, p. 29; *Harv. P. B.* plate 317; *Harv. Man.* p. 218; *Harv. Syn.* p. 188; *Atlas*, plate 74, fig. 349.

Ceramium *ceramicola*.—*Ag. Sp. Alg.* vol. ii. p. 155.

Goniotrichum *ceramicola*.—*Kütz. Phyc. Gen.* p. 244; *Sp. Alg.* p. 358 (excl. syn. *Carm.*).

Conferva *ceramicola*.—*Lyngb. Hyd. Dan.* p. 144, t. 48 D.; *Hook. Br. Fl.* vol. ii. p. 355; *Harv. Man.* 1st edit. p. 133.

Hab.—Parasitical on the smaller Algæ, in clear tide-pools. Summer. Not very uncommon.

Geogr. Dist.—Northern shores of Europe.

Description.—Filaments from a quarter to "an inch and a half in length," extremely slender and silky, but of very unequal diameter, cylindrical, scarcely tapering, articulated, the articulations inflated in the middle and slightly constricted at the dissepiments; longitudinally striate, and possibly, like *B. fusco-purpurea*, composed of radiating cellules. Substance very flaccid, and adhering closely to the paper. Colour, a fine rosy pink, somewhat faded in drying.

We have only seen dried specimens of this, and the plant is so delicate that it does not revive well on immersion, so as to show its original structure. Our specimens are only from a quarter to half an inch in length; but Dr. Harvey informs us that it sometimes grows to the length of an inch and a half, completely enveloping the plant on which it grows with a covering of the most delicate silken fibres, of the finest rose colour.

BANGIA CERAMICOLA.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—Plants of *Bangia ceramicola*, natural size.
2.—Portion of same, magnified.

BANGIA ELEGANS.—*Chauv.*

Gen. Char.—Frond cellular, "filiform, tubular, composed of numerous radiating cellules, disposed in transverse rows, and enclosed within a hyaline continuous sheath; spores purple or green, formed within each of the cells of the frond."—*Phyc. Brit.* Name in honour of Hoffman Bang, a Danish botanist, who wrote a work on the use of the *Confervæ* in the economy of nature.

Bangia *elegans.*—"Filaments minute, dichotomously branched, with very patent axils; branches containing a single row of simple or binate purple granular cells."—*Phyc. Brit.*

Bangia *elegans.*—*Chauv. Mem. Soc. Linn. Norm.* vol. vi. p. 13; *Alg. Norm.* Fasc. vii. No. 159; *Recherches,* p. 33; *Harv. P. B.* plate 246; *Harv. Man.* p. 218; *Harv. Syn.* p. 188; *Atlas,* plate 74, fig. 350.

Hab.—Parasitical on the smaller Algæ. Very rare. Dredged in Strangford Lough at Portaferry, adhering to *Gracilaria confervoides* (*Mr. W. Thompson,* 1838).

Geogr. Dist.—Coast of Normandy.

Description.—"Forming minute tufts, one to two lines long, resembling, to the naked eye, the tufts of *Callithamnion* in colour and size. Filaments dichotomously branched, several times forked, the branches cylindrical, curved, spreading, with very wide axils, obtuse at the tips. The younger parts of the filaments contain a string of closely set lenticular granules or cells, arranged like those of a *Lyngbya.* In the older parts the cells are less regularly placed, and are more distant, of a broadly spindle-like form, with a division in the centre, as if composed of two conical or sugar-loaf bodies. These are probably the ripe spores, which escape on the bursting of the tubular filament. The colour of the spores is a purplish lake, becoming greenish in decay."—*Phyc. Brit.*

The above characters and descriptions contain all that we know of this species, nor are we aware of the plant ever having been met with except on the above occasion, although it is possible that, from its minute size, it may have often escaped detection.

BANGIA ELEGANS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Tuft of *Bangia elegans*, natural size.
2.—Portion of same, magnified.
3.—The same, greatly magnified.
(Reduced from *Phyc. Brit.*)

RIVULARIA PLICATA.—*Carm.*

Gen. Char.—Frond hemispherical, globose, or forming solid or at length hollow irregular lobes, composed of attenuated filaments, annulated within, attached by a spherical cell, and closely packed in a gelatinous matrix. Name from *rivulus*, "a little brook," in allusion to the habitat of the first discovered species.

Rivularia *plicata*.—Fronds gregarious, forming gelatinous, hollow, irregularly lobed masses, compressed, plaited or rugose; filaments waved, much attenuated, connected in dichotomous series.

Rivularia *plicata*.—*Carm.*; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 392; *Harv. P. B.* plate 315; *Harv. Man.* p. 222; *Harv. Syn.* p. 189; *Atlas*, plate 75, fig. 351.

Lichen *corrugatus*.—*Dickson!* (fide *Borrer*).

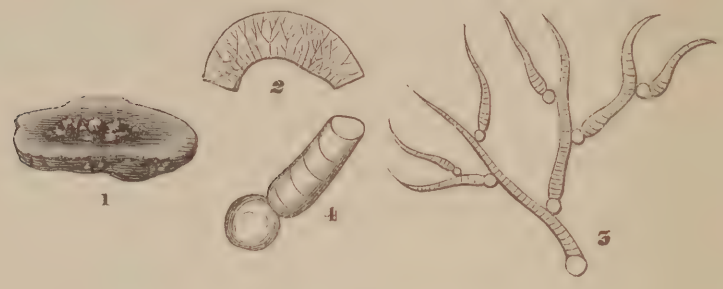
Hab.—On rocky sea-shores, where it is only occasionally overflowed by the tides. Not uncommon.

Geogr. Dist. —— ?

Description.—Fronds scattered in groups over the surface of the rock, at first solid, at length hollow, of very irregular shape, roundish or compressed, or forming more or less elongated lobes or fronds, from one to three lines in length, sometimes growing singly, often so densely grouped together that they press upon each other. Filaments corymbose, wavy, gradually attenuated to a fine point, annulated throughout; annuli distant, about a third of the diameter, the lowest or connecting cell spherical, hyaline; the whole connected in subalternate or dichotomous series, and closely packed in a gelatinous matrix, which constitutes the frond. Substance rather firm, gelatinous, adhering closely to paper. Colour, a dull dark green.

This curious little plant seems to be by no means uncommon on our rocky shores wherever there are pools of fresh water occasionally inundated by the sea, or where the rocks are flat and alternately exposed to the influence of fresh and salt water. The fronds often cover considerable spaces of rock, sometimes so densely as to form a crust which appears rugose on the surface, or more or less broken up into irregular lobes; when young and growing singly, the fronds are more or less hemispherical and solid; but in age they become inflated, irregularly distended, and at length torn into irregular lobes or segments.

Although when growing it possesses little beauty to attract the attention of the collector of pretty things, its curious structure when seen under the microscope is very remarkable, whether we consider its peculiar ramification as composing a single plant of which the parts adhere without inosculating, or as forming a kind of compound polyphytal republic, somewhat analogous to the Polyzoa in the animal kingdom.



RIVULARIA PLICATA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Plant of *Rivularia plicata*, natural size.
2.—Vertical section of a frond.
3.—Filament.
4.—Base of same. All magnified.

RIVULARIA ATRA.—*Roth.*

Gen. Char.—Frond hemispherical, globose, or forming solid or at length hollow irregular lobes, composed of attenuated filaments, annulated within, attached by a spherical cell, and closely packed in a gelatinous matrix. Name from *rivulus*, "a little brook," in allusion to the habitat of the first discovered species.

Rivularia *atra*.—Fronds hemispherical or globose, smooth, somewhat leathery; endochrome in the upper part moniliform, in the lower, annular, here and there constricted.

Rivularia *atra*.—*Roth, Cat. Bot.* vol. iii. p. 340; *Ag. Syn.* p. 130; *Ag. Syst.* p. 24; *E. Bot.* t. 1798; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 392; *Harv.* in *Mack. Fl. Hib.* part 3, p. 235; *Harv. P. B.* plate 239; *Harv. Man.* p. 222; *Harv. Syn.* p. 189; *Atlas*, plate 75, fig. 352.

Euactis *atra*.—*Kütz. Phyc. Gen.* p. 241.

Linckia *atra*.—*Lyngb. Hyd. Dan.* p. 195, t. 65.

Linckia *hemispherica*.—*Schum. Enum.* vol. ii. p. 114.

Tremella *hemispherica*.—*Linn. Syst. Nat.* vol. ii. p. 714; *Huds. Fl. Angl.* p. 565; *Lightf. Fl. Scot.* p. 900; *With. Br. Pl.* vol. iv. p. 81.

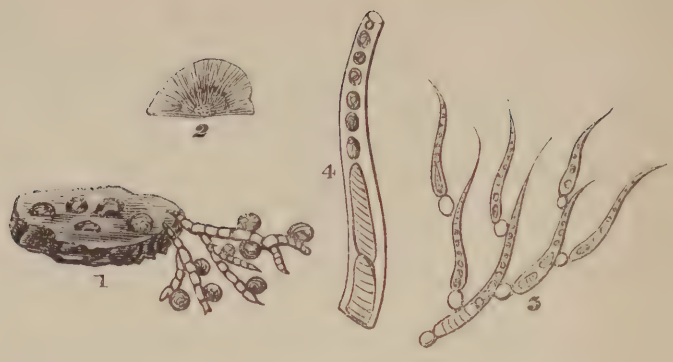
Chætophora *atra*.—*Ag. Disp.* p. 43.

Hab.—On rocks, stones, shells, Corallines and Algæ, between tide-marks. Perennial. Very abundant, and at all seasons.

Geogr. Dist.—Shores of Europe.

Description.—Fronds gregarious, hemispherical when growing on flat surfaces, globose when growing on the filiform Algæ; from a quarter of a line to a line and a half in diameter, regular, the surface smooth and shining. Filaments very much attenuated, connected together in subdichotomous series, not corymbose; endochrome beaded in the upper part, in the lower annulated, and here and there divided by deep constrictions into oblong portions; the whole densely packed in a firm leathery gelatine. Colour, a very dark green, almost black.

Extremely common on all our rocky shores, sometimes covering the rocks near high-water mark for miles together with innumerable minute hemispherical black dots, or as thickly clustering on the fronds of *Cladophora rupestris* and *Corallina officinalis*; it looks like little black fruit suspended from the delicate branches.



RIVULARIA ATRA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Plant of *Rivularia atra*, natural size.
2.—Vertical section of a frond.
3.—Filament.
4.—Middle portion of same. All magnified.

RIVULARIA NITIDA.—*Ag.*

Gen. Char.—Frond hemispherical, globose, or forming solid or at length hollow irregular lobes, composed of attenuated filaments, annulated within, attached by a spherical cell, and closely packed in a gelatinous matrix. Name from *rivulus*, "a little brook," in allusion to the habitat of the first discovered species.

Rivularia *nitida.*—Fronds rather large, firmly gelatinous, globose or irregularly lobed, solid, at length hollow, deep but bright green ; filaments mostly simple or unconnected.

Rivularia *nitida.—Ag. Syst.* p. 25 ; *Wyatt, Alg. Danm.* No. 50 ; *Endl.* 3rd Suppl. p. 12 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 235 ; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 393 ; *Harv. P. B.* plate 68 ; *Harv. Man.* p. 223 ; *Harv. Syn.* p. 190 ; *Atlas*, plate 75, fig. 353.

Rivularia *bullata.—Berk. Gl. Alg.* t. 2, f. 1 ; *J. Ag. Alg. Medit.* p. 9 ; *Endl.* 3rd Suppl. p. 13.

Scytochloria *nitida.—Harv.* in *Hook. Br. Fl.* l. c.

Alcyonidium *bullatum.—Lamour.*

Physactis *lobata.—Kütz. Phyc. Gen.* p. 236, t. 4, f. 5.

Hab.—On marine rocks, about half-tide level. Annual. Summer and autumn. Common on the southern shores of England, south and west of Ireland.

Geogr. Dist.—Baltic Sea ; Atlantic shores of Europe ; Mediterranean Sea.

Description.—Fronds globose, roundish, or more or less irregularly lobed, firmly gelatinous or subcoriaceous, solid when young, at length hollow, often much inflated. Filaments mostly near the surface, gradually attenuated to a very fine point, closely annulated throughout, mostly simple or unattached, connecting cell large, coloured ; gelatine firm, somewhat coriaceous. Colour, a deep but rather clear bright green.

Readily known from the last species by its larger size, brighter colour, and still more by the mostly unconnected filaments, attenuated to a long setaceous point, regularly annulated throughout. From *R. plicata* it is distinguished by its unconnected filaments, the large connecting cell, its brighter colour, and larger size.

We have only seen specimens from the south of England, but it is said to be still more plentiful on the south and west of Ireland. It is more of a summer plant than *R. atra*, which may be found almost at any season.

RIVULARIA NITIDA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Frond of *Rivularia nitida*, natural size.
2.—Vertical section of same.
3.—Filament.
4.—Portion of same. All magnified.

SCHIZOSIPHON WARRENIÆ.—*Casp.*

Gen. Char.—"Frond globose or lobed, gelatinous, composed of closely-packed, annulated, radiating sheathed filaments, each of which springs from a pellucid cell. Sheath gelatino-membranous, vertically cleft into innumerable hair-like shreds. Name from σχίζω, 'to divide,' and σίφων, 'a tube.'"—*Phyc. Brit.*

Schizosiphon *Warreniæ*.—"Fastigiately branched, the lowest cell of the branches wider, hemispherical, lateral; sheaths dark coloured, the fibres often spiral; apices of the branches much attenuated."—*Casp. Phyc. Brit.*

Schizosiphon *Warreniæ*.—*Caspary* in *Ann. and Mag. Nat. Hist.* 3rd Series, vol. vi. p. 266, t. 8; *Harv. P. B.* plate 316; *Harv. Syn.* p. 190; *Atlas*, plate 75, fig. 354.

Hab.—On rocks at high-water, in places often exposed to the dripping of fresh water. Not uncommon on the shores of the south of England. Rarer in Scotland.

Geogr. Dist.——?

Description.—"The plant forms a solid crust over the horizontal rock to the extent of many square feet, in larger or smaller patches, from a quarter to half an inch in thickness, throwing up on the surface little spherical elevations, of different diameter and height." The stem and branches are, with the exception of the apices, enveloped in a sheath of brownish green jelly. This sheath is composed of many funnel-shaped gelatinous tubes, succeeding each other at little distances, the upper part with its thinner end in the wider of the lower, and surrounding the stem in such a way that this seems to be covered with a solid gelatinous mass. The upper end of each tube is split into a great many hair-like threads, of very minute diameter, which frequently curl about in an irregular manner, but often represent a phenomenon rarely found amongst Algæ, forming as they do a real spiral round the gelatinous cover of one or two branches or stems.—*Dr. Caspary* in *Phyc. Brit.*

We prefer copying Dr. Caspary's description of this species nearly as given in *Phyc. Brit.*, as our specimens collected on the east coast of Scotland are somewhat different, although they appear to be identical with the figure given by Dr. Harvey. It is by no means uncommon here, and perhaps elsewhere, and we have met with it or very closely allied forms, in various places far beyond the influence of salt-water. Indeed, we cannot say that the salt-water could really exercise any

influence over it in any of the habitats where we have met with it, although it will be occasionally washed with it at high tides. With the fresh-water, however, the plants are constantly suffused. It is quite possible that we may have more than one native species of this curious genus, even allowing that of the thirty-two species mentioned by Prof. Harvey as described by Kützing, two-thirds may be only varieties.

SCHIZOSIPHON WARRENIÆ.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Plant of *Schizosiphon Warreniæ*, natural size.
2.—Filament.
3.—Base and apex of filament. Both magnified.

SCHIZOTHRIX CRESSWELLII.—*Harv.*

Gen. Char.—"Filaments involved in a thick lamellar sheath, rigid, curled, thickened at the base, at length longitudinally divided; *spermatia* lateral."—*Kütz.* Name from σχίζω, "I divide," and θρὶξ, "a hair," alluding to the longitudinally split filaments.

Schizothrix *Cresswellii.*—Fronds forming dense, cushion-like tufts; filaments collected into branching fastigiate bundles.

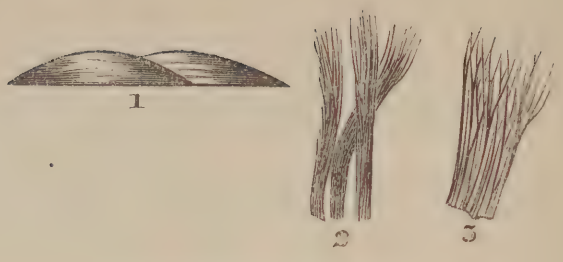
Schizothrix *Cresswellii.—Harv.* in *Herb.* (1846); *Harv. P. B.* plate 160; *Harv. Man.* p. 223; *Harv. Syn.* p. 191; *Atlas*, plate 75, fig. 355.

Hab.—Near high-water mark on sandstone maritime rocks, exposed to the drip of fresh water. Annual. Winter. Near the Picket Rock, Sidmouth (*Rev. R. Cresswell*).

Geogr. Dist.—South coast of England?

Description.—Fronds at first forming slightly convex patches, which soon become confluent, and form continuous strata, spreading over the surface of the rock in soft silky or velvety patches, from half an inch to an inch in thickness. Filaments extremely slender, collected into dense rope-like bundles, "and once or twice divided in a dichotomous manner, apparently a splitting of the original tube or cell." The bundles of filaments themselves have a tendency to become dichotomously divided, or rather, perhaps, separated by the absorption of the gelatinous cement. Substance soft, closely adhering to paper. Colour, a greenish olive, brownish when dry, without gloss.

This species we have only had an opportunity of examining in the dried state; indeed, we are not aware that it has ever been found except in the original station, where, however, it is said to be abundant.



SCHIZOTHRIX CRESSWELLII.

EXPLANATION OF DISSECTION, &c.

Fig. 1.—Frond, one-third natural size.
2.—Bundle of filaments, natural size.
3.—Apex of a filament, magnified.

CALOTHRIX CONFERVICOLA.—*Ag.*

Gen. Char.—"Filaments destitute of mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating; tube continuous; endochrome green, densely annulated, at length dissolving into lenticular sporidia."—*Phyc. Brit.* Name from καλὸς, "beautiful," and θρὶξ, "a hair."

Calothrix *confervicola.*—Filaments much tufted, opaque, slightly curved, rather rigid, erect.

Calothrix *confervicola.*—*Ag. Syst.* p. 70; *Wyatt, Alg. Danm.* No. 229; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 367; *Harv.* in *Mack. Fl. Hib.* part 3, p. 237; *Harv. P. B.* plate 254; *Harv. Man.* p. 224; *Harv. Syn.* p. 191 *Atlas*, plate 75, fig. 356; *Harv. N. B. A.* part 3, p. 105.

Leibleinia *confervicola.*—*Endl. Gen.* No. 57, 3rd Suppl. p. 21.

Leibleinia *purpurea, chalybea et æruginea?*—*Kütz. Phyc. Gen.* p. 221.

Oscillatoria *confervicola.*—*Ag. Syn.* p. 110; *Lyngb. Hyd. Dan.* p. 94.

Conferva *confervicola.*—*Dillw. Conf.* t. 8; *Roth, Cat. Bot.* vol. iii. p. 193; *Fl. Dan.* t. 1484, f. 1; *E. Bot.* t. 2576.

Hab.—On the smaller Algæ, between tide-marks. Common. Annual. Summer and autumn.

Geogr. Dist.—Shores of Europe and North America.

Description.—Filaments much tufted, from one to two lines in length, scarcely tapering, slightly curved or waved, forming dense stellate tufts, quite free or slightly adhering at the base, simple or "occasionally throwing out from about the centre of the filament tufts of short ramuli. Sometimes minute spherical bodies are found attached to the sides of the filaments. The exact nature of these bodies has not been determined.' Substance rather rigid, but closely adhering to the paper. Colour, a deep brownish green.

A very common species on all our shores, often covering the whole fronds of *Ceramium rubrum*, its favourite site, with a dense shaggy coat, so as completely to metamorphose its appearance, and give it the aspect of battered plants of *Cladostephus*. The spherical bodies we have only seen on dried specimens from Arran, not having met with them on recent specimens.

CALOTHRIX CONFERVICOLA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Plants of *Calothrix confervicola* on *Ceramium*, natural size.
2.—Same, magnified.
3.—Portion of same, greatly magnified.

CALOTHRIX LUTEOLA.—*Grev.*

Gen. Char.—"Filaments destitute of mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating; tube continuous; endochrome green, densely annulated, at length dissolving into lenticular sporidia."—*Phyc. Brit.* Name from καλὸς, "beautiful," and θρὶξ, "a hair."

Calothrix *luteola.*—Filaments simple, cylindrical, very minute, scattered, almost hyaline; endochrome pale, indistinctly annulated, often interrupted.

Calothrix *luteola.*—*Grev. Crypt. Fl.* t. 299; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 367; *Harv. P. B.* plate 342; *Harv. Man.* p. 224; *Harv. Syn.* p. 192; *Atlas*, plate 77, fig. 361.

Calothrix *melaleuca.*—*Carm. Alg. App. MSS.*

Leibleinia *luteola.*—*Kütz. Sp. Alg.* p. 276.

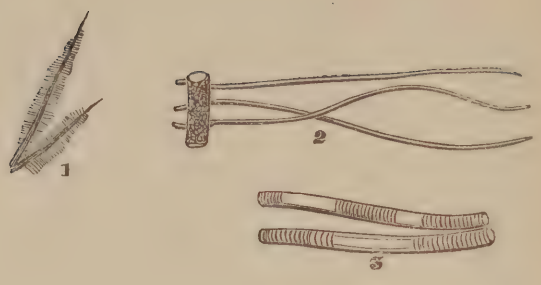
Hab.—On marine, filiform Algæ, in tide-pools. Not uncommon.

Geogr. Dist. —— ? Heligoland (*Kütz.*).

Description.—Filaments scarcely half a line in length, excessively slender and flexible, distantly scattered, cylindrical, of equal diameter throughout; the apices rounded and obtuse, straight or slightly waved. Endochrome very pale yellowish green, very indistinctly annulated, and frequently interrupted by empty spaces. Substance very soft and flaccid, adhering closely to paper. Colour, a yellowish green.

This pretty little species appears to be not unfrequent on the west coast, and may possibly be equally plentiful on the east; but its minute size may readily enable it to escape any except the most inquisitive eye, few collectors thinking it worth while to look after such minute entities. Our specimens are from Arran, where it seems to be not uncommon on the filiform *Enteromorphæ.*

In some specimens they are pretty thickly scattered, but not tufted. So delicate are the filaments, that they often adhere together, and thus the free extremities have the appearance of branches.



CALOTHRIX LUTEOLA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Calothrix luteola*, natural size, on *Enteromorpha*.
2.—The same, slightly magnified.
3.—Portion of same, greatly magnified.

CALOTHRIX FASCICULATA.—*Ag.*

Gen. Char.—"Filaments destitute of mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating ; tube continuous; endochrome green, densely annulated, at length dissolving into lenticular sporidia."—*Phyc. Brit.* Name from καλὸς, "beautiful," and θρὶξ, "a hair."

Calothrix *fasciculata.*—Filaments densely tufted, erect, subulate, nearly straight, gradually attenuated from the base to a somewhat acute apex, bearing fasciculi of pseudo-branches.

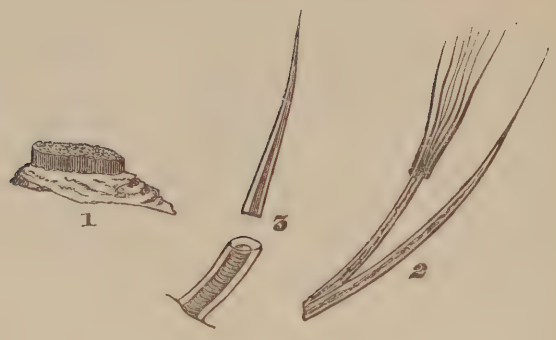
Calothrix *fasciculata.*—*Ag. Syst.* p. 71 (excl. syn.) ; *Harv.* in *Hook. Br. Fl.* p. 368 ; *Harv.* in *Mack. Fl. Hib.* part 3, p. 237 ; *Harv. P. B.* plate 58 A. ; *Harv. Man.* p. 224 ; *Harv. Syn.* p. 192; *Atlas,* plate 77, fig. 362.

Hab.—Spreading over marine rocks about half-tide level. Common. Found at all seasons.

Geogr. Dist.—Baltic Sea ; British Islands.

Description.—Filaments densely packed into extensive strata, one to three lines in height, erect, scarcely waved, cylindrical, tapering upwards to a rather acute pellucid point ; simple, or at length bearing a fascicle of short subulate pseudo-branches attached to or a little above the middle. Endochrome distinctly and closely ringed throughout, of a deep bluish green colour, walls of the tube rather thick. Substance somewhat flaccid, more or less adhering to paper. Colour, a deep glaucous green.

This, Professor Harvey considers closely allied to the following, and even supposes that it may possibly be only a more perfectly developed state of that species, the result of its growing in deeper water. We have only seen it in the dried state, and in that state the structure of the filaments of both species is very much the same, and the differences are such as might be expected to result from more favourable circumstances of growth.



CALOTHRIX FASCICULATA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Calothrix fasciculata*, tuft, natural size.
2.—Filaments.
3.—Base and apex of a filament. Both magnified.

CALOTHRIX SCOPULORUM.—*Ag.*

Gen. Char.—"Filaments destitute of mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating; tube continuous; endochrome green, densely annulated, at length dissolving into lenticular sporidia."—*Phyc. Brit.* Name from καλὸς, "beautiful," and θρὶξ, "a hair."

Calothrix *scopulorum.*—Filaments simple, densely cæspitose, flexuous, attenuated upwards to a rather obtuse point.

Calothrix *scopulorum.*—*Ag. Syst.* p. 70; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 368; *Harv.* in *Mack. Fl. Hib.* part 3, p. 237; *Harv. P. B.* plate 58 B.; *Harv. Man.* p. 224; *Harv. Syn.* p. 192; *Atlas*, plate 77, fig. 363; *Harv. N. B. A.* part 3, p. 105.

Oscillatoria *scopulorum.*—*Ag. Syn.* p. 111; *Hook. Fl. Scot.* part 2, p. 79; *Grev. Fl. Edin.* p. 304.

Conferva *scopulorum.*—*Web. et Mohr, Reis.* p. 195, t. 3, f. *a. b.*; *Roth, Cat. Bot.* vol. iii. p. 191; *Dillw. Conf.* Introdn. p. 39, Suppl. t. A.; *E. Bot.* t. 2171.

Hab.—On rocks near high-water mark. Common.

Geogr. Dist.—Shores of Europe and North America.

Description.—Filaments densely cæspitose, from half a line to a line and a half in height, very flexuous, and closely compacted into a soft velvety slimy cushion, cylindrical, attenuated upwards to a rather obtuse point. Endochrome of a dull yellowish green, closely and generally distinctly annulated. Substance rather flaccid and very lubricous, closely adhering to the paper. Colour, a yellowish green.

A very common species on most shores, forming a thin soft velvet-like stratum, often of considerable extent, on the surface of rocks, about, or even above high-water mark, in which latter situation the filaments are generally more tortuous and twisted, but they never appear to be entangled, being simply glued together, chiefly towards the base, by a tenacious, gelatinous cement, which is more or less diffused over the whole plant.

CALOTHRIX SCOPULORUM.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Calothrix scopulorum*, tuft, natural size.
2.—Filaments.
3.—Base and apex of a filament. Both magnified.

CALOTHRIX PANNOSA.—*Ag.*

Gen. Char.—"Filaments destitute of mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating; tube continuous; endochrome green, densely annulated, at length dissolving into lenticular sporidia."—*Phyc. Brit.* Name from καλὸς, "beautiful," and θρὶξ, "a hair."

Calothrix *pannosa.*—Filaments densely cæspitose, closely interwoven and twisted together, cylindrical throughout and obtuse; endochrome dark green, distinctly annulated.

Calothrix *pannosa.*—*Ag.* in *Bot. Zeit.* vol. x. p. 635, No. 42; *Endl.* 3rd Suppl. p. 13; *Harv. P. B.* plate 76; *Harv. Man.* p. 225; *Harv. Syn.* p. 195; *Atlas*, plate 76, fig. 357.

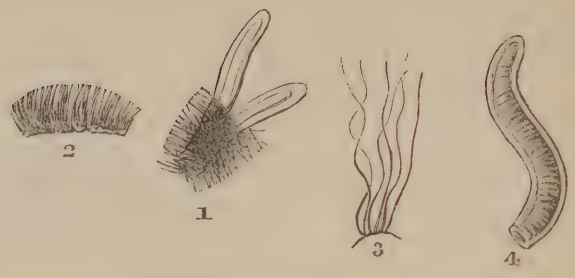
Calothrix *lamellata.*—*Harv.* in *Herb.* 1842.

Hab.—Growing on rocks, oftener on *Fucus canaliculatus* and *Corallina officinalis*, &c. Perennial. Not uncommon.

Geogr. Dist.—British Islands; Adriatic Sea; at Trieste (*C. Agardh*).

Description.—Filaments erect, densely tufted or cæspitose, very flexuous, and interwoven together into a compact and level cloth-like stratum, rigid, cylindrical, and of equal diameter throughout, the apex rounded and obtuse. Endochrome dark green, not very closely but very distinctly annulated. The filaments are often more or less collected and twisted into fasciculi, giving the surface an uneven or pitted appearance, which is rather harsh to the feel from the rigidity of the filaments.

This curious production seems not uncommon in several localities on the south-west of Ireland, and it has been met with on the south-western shores of England, but in less abundance. It seems to prefer growing on rocks (*Phyc. Brit.*), as there it is always most luxuriant, but it has no objection to extend its range over any of its marine neighbours with which it comes in contact, covering them with a thick, coarse, bristly-like coat.



CALOTHRIX PANNOSA.

EXPLANATION OF DISSECTIONS, &c.

Figs. 1, 2.—*Calothrix pannosa*, tufts, natural size.
3.—Filaments.
4.—Apex of a filament. Both magnified.

CALOTHRIX SEMIPLENA.—*Ag.*

Gen. Char.—"Filaments destitute of mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating. Tube continuous; endochrome green; densely annulated; at length dissolving into lenticular sporidia."—*Phyc. Brit.* Name from καλὸς, "beautiful," and θρὶξ, "a hair."

Calothrix *semiplena.*—Filaments erect, slender, tufted or cæspitose, the apices unequal, collected into tooth-like fasciculi; endochrome dark, somewhat glaucous green, interrupted here and there.

Calothrix *semiplena.*—*Ag. Bot. Zeit.* 1827, No. 40; *Harv. P. B.* plate 309; *Harv. Syn.* p. 193; *Atlas*, plate 77, fig. 364.

Calothrix *lamellata.*—*Harv.* in *Herb.* 1844 ! (excl. spec. from Roundstone).

Lyngbya *semiplena.*—*J. Ag. Alg. Medit.* p. 11.

Lyngbya *lutescens.*—*Leib.* (fide *Kütz*).

Leibleinia *semiplena.*—*Kütz. Phyc. Gen.* p. 221; *Sp. Alg.* p. 278.

Hab.—In rock-pools near high-water mark, on *Corallina officinalis*, &c. Kilkee, (*Dr. Harvey*); Sidmouth (*Rev. R. Cresswell*); Belfast Bay (*Dr. Dickie*).

Geogr. Dist.—Mediterranean and Adriatic Seas (*Agardh*); shores of Norway (*Areschoug*); Cherbourg (*Lenormand*, as *C. pulvinata? Ag.*).

Description.—Filaments attached, erect, densely tufted or cæspitose, closely adhering into pointed tooth-like bundles, somewhat flexuous, cylindrical, of equal diameter throughout; apices rounded and obtuse, from half an inch to an inch or rather more in height. Endochrome of a dark but rather glaucous green, closely but rather distinctly annulated, here and there interrupted at irregular distances by empty but very unequal spaces. Substance rather rigid, but adhering pretty firmly to paper.

This species is perhaps not very uncommon, although it has hitherto only been observed in few localities, and these chiefly in the south and south-west. The tooth-like bundles of filaments, which are rather less curled and twisted, less rigid, and the interrupted endochrome, are the chief marks of distinction between this and the last species.

CALOTHRIX SEMIPLENA.

Fig. 1.—*Calothrix semiplena,* natural size.
2.—Filaments.
3.—Portion of same. Both magnified.

CALOTHRIX HYDNOIDES.—*Carm.*

Gen. Char.—"Filaments destitute of mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating; tube continuous; endochrome green, densely annulated, at length dissolving into lenticular sporidia."—*Phyc. Brit.* Name from καλὸς, "beautiful," and θρὶξ, "a hair."

Calothrix *hydnoides.* — Filaments forming a dense pilose crust, flexuous, cylindrical, obtuse, cohering upwards into short tooth-like fascicles, spuriously branched; walls of the cells very thick.

Calothrix *hydnoides.—Carm.* in *Hook. Br. Fl.* vol. ii. p. 369; *Harv. P. B.* plate 306; *Harv. Man.* p. 225; *Harv. Syn.* p. 194; *Atlas*, plate 77, fig. 365.

Scytonema *hydnoides.—Carm. Algæ Appinenses, MSS.* cum icone.

Symplaca *hydnoides.—Kütz. Sp. Alg.* p. 272.

Hab.—On the clayey sea-shore, near high-water mark. Appin (*Capt. Carmichael*); near Queenstown, Cork Harbour, and several other places (*Dr. Harvey*); Sidmouth (*Rev. R. Cresswell*).

Geogr. Dist.—Channel coast of France (*M. Lenormand*).

Description.— Filaments densely cæspitose, forming pilose patches, often of considerable extent, on the surface of the rock, half a line to a line in length, their bases much entangled, their apices closely cohering into numerous tooth-like processes or bundles, cylindrical, flexuous, of equal diameter throughout; the apices slightly tapering, rounded and obtuse, spuriously branched, the upper ones gradually shorter. Endochrome continuous, dark green, rather distinctly but not very closely annulated; the walls of the tubes very thick. Substance rather rigid and harsh to the feel, not adhering very closely to paper.

Not perhaps a very scarce species, although few localities are as yet known; from all the previous species it may be known by its spuriously branched filaments, cohering at their summits into tooth-like bundles. We have only seen specimens from the south-west of England, where it seems to be less common than in Ireland, on the shores of which it is not scarce.

CALOTHRIX HYDNOIDES.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Calothrix hydnoides*, tuft, natural size.
2.—Filaments.
3.—Portion of same.
4.—Apex of a filament. All magnified.

CALOTHRIX CÆSPITULA.—*Harv.*

Gen. Char.—"Filaments destitute of mucous layer, erect, tufted or aggregated, fixed at the base, somewhat rigid, not oscillating; tube continuous; endochrome green, densely annulated, at length dissolving into lenticular sporidia."—*Phyc. Brit.* Name from καλὸς, "beautiful," and θρὶξ, "a hair."

Calothrix *cæspitula.* — "Filaments forming close, convex, blackish green tufts, densely packed, flexuous, flaccid and obtuse, not attenuated, here and there spuriously branched; border of the filaments narrow."—*Phyc. Brit.*

Calothrix *cæspitula.*—*Harv.* in *Hook. Br. Fl.* vol. ii. p. 369; *Harv.* in *Mack. Fl. Hib.* part 3, p. 237; *Harv. P. B.* plate 305; *Harv. Man.* p. 225; *Harv. Syn.* p. 194; *Atlas*, plate 77, fig. 366.

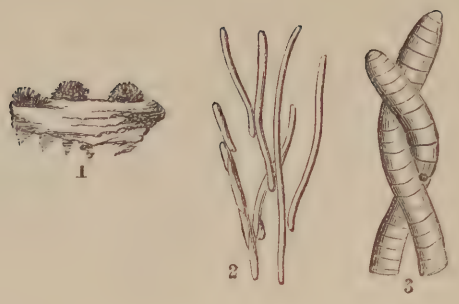
Leibleinia *cæspitula.*—*Kütz. Sp. Alg.* p. 278.

Hab.—Marine rocks, near high-water mark. Annual? Summer. Miltown Malbay, 1831 (*Dr. Harvey*).

Geogr. Dist. —— ? Adriatic (*Kütz.*).

Description.—"Tufts very convex, from a quarter of an inch to an inch and a-half in diameter, hemispherical or irregular in outline, deep blackish green, flaccid, yielding to the touch, growing either on the naked rock or on Corallines, shells, &c. Filaments densely packed together, often twisted round each other in small bundles, either simple or oppositionally branched, obtuse, cylindrical, not tapering to either end; branches erect. Endochrome dense, filling the tube; the striæ dense, and strongly marked; border narrow."—*Phyc. Brit.*

This pretty little species we have not seen, and only know from the characters and descriptions above quoted. It seems to be closely allied to the last species, but is of a different habit, the filaments not adhering in tooth-like processes; it also differs in having the walls of the cells extremely thin. This is one of the many discoveries of Professor Harvey, who found it in pools between tides at Miltown Malbay; we are not aware of its occurrence in recent times.



CALOTHRIX CÆSPITULA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Calothrix cæspitula*, plants, natural size.
2.—Same, magnified.
3.—Portion, greatly magnified.

Plate CCVII.

LYNGBYA MAJUSCULA.—*Harv.*

Gen. Char.—"Filaments destitute of a mucous layer," free or attached, not cohering or oscillating; tube continuous; endochrome green or purplish, closely annulated, "and finally separating into lenticular sporidia."—*Phyc. Brit.* Name in honour of H. C. Lyngbye, a celebrated Danish Algologist.

Lyngbya *majuscula*.—Filaments much tufted, waved and curled, interwoven into dense bundles, very closely but distinctly annulated, dark glaucous green.

Lyngbya *majuscula*.—*Harv.* in *Hook. Br. Fl.* vol. ii. p. 370; *Harv.* in *Mack. Fl. Hib.* part 3, p. 238; *Harv. P. B.* plate 62; *Harv. Man.* p. 226; *Harv. Syn.* p. 195; *Atlas*, plate 76, fig. 358; *Harv. N. B. A.* part 3, p. 101; *Wyatt, Alg. Danm.* No. 147.

Lyngbya *crispa*.—*Ag. Syst.* p. 74 (in part).

Conferva *majuscula*.—*Dillw. Conf.* Suppl. t. A.

Hab.—On mud and sand-covered rocks in the sea, at and below half-tide level; also thrown up from deep water after storms. Annual. Summer and autumn.

Geogr. Dist.—British Islands; Atlantic shores of North America.

Description.—Filaments densely tufted or cæspitose, forming strata, often of considerable extent, much entangled, rather stout, curled, and twisted, cylindrical, of equal diameter throughout; apices rounded and obtuse, from one to two inches in length, simple or occasionally but rarely spuriously branched. Endochrome dull but rather deep glaucous green, very closely annulated, occasionally interrupted. Substance rigid, but adhering to the paper.

A coarse growing plant, the largest and most conspicuous of the genus, forming very much twisted and entangled tufts, chiefly on the south and south-western shores, where it seems to be of not uncommon occurrence.

EXPLANATION OF PLATE CCVII.

Fig. 1.—*Lyngbya majuscula*, natural size.
2.—Portion of same, greatly magnified.

LYNGBYA majuscula. HARV.

Nature Printed by Henry Bradbury.

LYNGBYA FERRUGINEA.—*Ag.*

Gen. Char.—"Filaments destitute of a mucous layer," free or attached, not cohering or oscillating; tube continuous; endochrome green or purplish, closely annulated, "and finally separating into lenticular sporidia."—*Phyc. Brit.* Name in honour of H. C. Lyngbye, a celebrated Danish Algologist.

Lyngbya *ferruginea*.—Filaments extremely slender, of a dark green colour, "changing to a pale chestnut."

Lyngbya *ferruginea*.—*Ag. Sp. Alg.* p. 73; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 226; *Harv. P. B.* plate 311; *Harv. Man.* p. 226; *Harv. Syn.* p. 195; *Atlas*, plate 78, fig. 367; *Harv. N. B. A.* part 3, p. 102.

Lyngbya *æruginosa*.—*Ag. Syst.* p. 74; *Kütz. Sp. Alg.* p. 282.

Lyngbya *subsalsa*.—*Carm. MSS.*

Scytonema *effusum*.—*Carm. MSS.* (*ante*).

Hab.—In mud-bottomed pools of brackish water by the sea-side filled at spring-tides. Appin (*Capt. Carmichael*); Aberdeen (*Dr. Dickie*); likely to be common.

Geogr. Dist.—North of Europe and North America.

Description.—Filaments extremely slender, forming rather loose but extensive strata, but slightly interwoven, of a rather dark glaucous green colour, pale in the microscope, "passing gradually into a pale chestnut" (*Carm.* in *Phyc. Brit.*). Endochrome rather distantly and not very distinctly annulated; walls of the tube very thin, scarcely apparent when the colouring matter is within. Substance flaccid, adhering to the paper, dull and without the least gloss when dry.

The filaments of this species are much finer than those of the last, the annulations wider, sometimes rather more apparent, and the walls of the tube are so thin that the whole appears to be coloured. We have not seen it in the recent state, but the colour seems to be well preserved in drying, and is more glaucous than when the plant is fresh, when the colour of the structure is of a rather deep but not bright or glossy green.

LYNGBYA FERRUGINEA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Lyngbya ferruginea*, natural size.
2.—The same.
3.—Portion of same. Both magnified.

LYNGBYA CARMICHAELII.—*Harv.*

Gen. Char.—"Filaments destitute of a mucous layer," free or attached, not cohering or oscillating; tube continuous; endochrome green or purplish, closely annulated, "and finally separating into lenticular sporidia."—*Phyc. Brit.* Name in honour of H. C. Lyngbye, a celebrated Danish Algologist.

Lyngbya *Carmichaelii.*—Filaments elongate, cylindrical, of equal diameter throughout, very much curled and interwoven, "tube imperfectly jointed."

Lyngbya *Carmichaelii.—Harv.* in *Hook. Br. Fl.* vol. ii. p. 371; *Harv. P. B.* plate 186 A.; *Harv. Man.* p. 226; *Harv. Syn.* p. 195; *Atlas*, plate 78, fig. 368; *Wyatt, Alg. Danm.* No. 230.

Lyngbya *crispa.—Carm. Alg. App. MS.* (not of *Ag.*)

Hormotrichum *Carmichaelii.—Harv. N. B. A.* part 3, p. 90.

Hab.—On marine rocks between tide-marks. On *Fuci*, *Zostera*, &c. Annual. Summer. Not uncommon.

Geogr. Dist. —— ? Atlantic shores of North America.

Description.—Filaments forming often very extensive and closely interwoven strata, very much curled and twisted, especially when old, then very much entangled, cylindrical, and of equal diameter throughout, from half an inch to several inches in length. Endochrome at first not very distinctly annulated, at length separating and condensing into portions or sporidia, which are separated by spaces nearly equal to their length, and do not nearly equal the tube in diameter. Substance rather rigid, but more or less adhering to paper. Colour, a dark but dull green, fading to a pale yellowish green without gloss.

This and the following species differ from the others of the genus, in having the tube imperfectly jointed, as the external constrictions corresponding to the internal dissepiments are generally very apparent and well defined, especially after the escape of the colouring matter. It appears to be one of the more common species, and is occasionally mixed with *Conferva implexa* and *tortuosa*, but may be readily distinguished by its shorter articulations and different colour.

LYNGBYA CARMICHAELII.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Lyngbya Carmichaelii*, natural size.
2.—The same.
3.—Portion of same. Both magnified.

LYNGBYA SPECIOSA.—*Carm.*

Gen. Char.—"Filaments destitute of a mucous layer," free or attached, not cohering or oscillating; tube continuous; endochrome green or purplish, closely annulated, "and finally separating into lenticular sporidia."—*Phyc. Brit.* Name in honour of H. C. Lyngbye, a celebrated Danish Algologist.

Lyngbya *speciosa.*—"Filaments long, flaccid, straight, at length curled, the margin crenate, forming bright yellow green strata, glossy when dry; tube imperfectly jointed."—*Phyc. Brit.*

Lyngbya *speciosa.*—*Carm. Alg. Appin.* ined.; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 371; *Harv. P. B.* plate 136 B.; *Harv. Man.* p. 227; *Harv. Syn.* p. 196; *Atlas*, plate 78, fig. 369; *Wyatt, Alg. Danm.* No. 196.

Hormotrichum *speciosum.*—*Harv. N. B. A.* part 3, p. 90.

Hab.—On rocks and *Fuci*, between tide-marks. Annual. Summer. Not uncommon.

Geogr. Dist. —— ?

Description. — This species, like *L. Carmichaelii*, forms widely-spreading strata of a vivid green colour, covering the surface of rocks and *Fuci* with a fleecy coat till lifted by the returning tide. The diameter of the filament is nearly twice as great as in *L. Carmichaelii*, the colour is greatly brighter, and the substance more gelatinous and glossy. In other respects the plants closely resemble each other. Filaments at first straight, three or four inches long, flaccid, at length becoming curled and crenate. Endochrome at first nearly filling the tube, gradually contracting as it solidifies, and at length formed into a lenticular *sporidium*, which, when ripe, bursts through the walls of the tube, leaving the filament perfectly colourless. A more or less evident division into cells is observable."—*Phyc. Brit.*

This species we have not seen, although we believe it to be not unfrequent. It is considered to be very closely allied to the last, but to be twice its diameter, of a brighter colour, more lubricous and glossy, and should be looked for in similar localities.

LYNGBYA SPECIOSA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Lyngbya speciosa*, natural size.
2.—The same.
3.—Portion of same. Both magnified.

LYNGBYA FLACCA.—*Harv.*

Gen. Char.—"Filaments destitute of a mucous layer," free or attached, not cohering or oscillating; tube continuous; endochrome green or purplish, closely annulated, "and finally separating into lenticular sporidia."—*Phyc. Brit.* Name in honour of H. C. Lyngbye, a celebrated Danish Algologist.

Lyngbya *flacca.* — Filaments parasitical, densely tufted, or rather cæspitose, very slightly waved, simple, with here and there a short subulate rootlet, articulated; articulations scarcely so long as their diameter.

Lyngbya *flacca.*—*Harv.* in *P. B.* list, vol. i. p. 15; *Harv. P. B.* plate 300; *Harv. Man.* p. 227; *Harv. Syn.* p. 196; *Atlas*, plate 76, fig. 359.

Hormidium *flaccum.*—*Kütz. Phyc. Gen.* p. 244.

Hormotrichum *flaccum.*—*Kütz. Sp. Alg.* p. 381.

Conferva *flacca.*—*Dillw.* t. 49; *E. Bot.* t. 1943; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 354; *Harv. Man.* 1st edit. p. 131.

Hab.—Parasitical on several of the smaller Algæ in tide-pools. On *Fuci*, and on floating timber. Annual. Summer. Not uncommon.

Geogr. Dist.—Atlantic shores of Europe.

Description.—Filaments parasitical, forming dense pencil-like tufts on other Algæ, from half an inch to an inch and a-half in length, extremely delicate and silky, very slightly curved, quite simple, but emitting here and there short root-like processes, tapering to an obtuse point. The filaments themselves are cylindrical, scarcely tapering, marked with distinct striæ indicative of dissepiments, which, however, are not constricted. Articulations rather shorter than their diameter. Endochrome at length very much contracted, not half filling the cell either in length or breadth, and at length bursting through the tube by rupturing its walls, which are thin and pellucid. Substance rather flaccid, and adhering closely to paper. Colour, a fine grass green, but changing to a yellowish green in drying.

This fine species is of common occurrence in the earlier summer months, having a peculiar predilection for *Fucus serratus* and *vesiculosus*, but is not unfrequent on other Algæ, sometimes completely investing them with a bright green shaggy coat.

The root-like processes are not always present, but are occasionally met with, and, like the roots of *Cladophoræ*, arise from the middle of the articulation, and not, like the branches of these plants, from

the apex ; hence we conclude that they have more affinity with roots than with branches. Their cells containing colouring matter is no objection to this view, as the roots of *Cladophoræ* often do the same.

The articulations of this and the two preceding species closely assimilate them to the *Confervæ*, and Professor Harvey has very justly pointed out the close relation between them and *C. Youngana*, *Bangioides*, &c., which are remarkable among their congeners for the rapidity with which the colouring matter bursts through the walls of the cells.

LYNGBYA FLACCA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Lyngbya flacca*, natural size.
2.—The same.
3.—Portion of same. Both magnified.

LYNGBYA CUTLERIÆ.—*Harv.*

Gen. Char.—"Filaments destitute of a mucous layer," free or attached, not cohering or oscillating; tube continuous; endochrome green or purplish, closely annulated, "and finally separating into lenticular sporidia."—*Phyc. Brit.* Name in honour of H. C. Lyngbye, a celebrated Danish Algologist.

Lyngbya *Cutleriæ*.—"Filaments excessively slender, soft, articulated; articulations about as long as broad, the endochrome at length formed into a spherical sporidium."—*Phyc. Brit.*

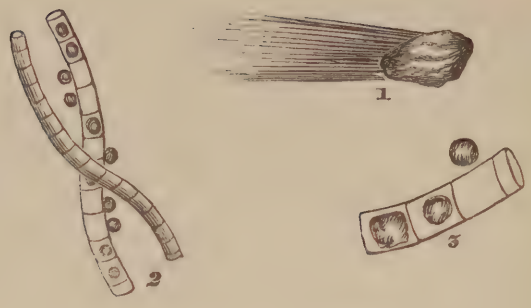
Lyngbya *Cutleriæ*.—*Harv. P. B.* plate 336; *Harv. Syn.* p. 197; *Atlas*, plate 78, fig. 370.

Hab.—In æstuaries. Annual. Spring and summer. Near the mouth of the Otter (*Budleigh*); Salterton, covered every tide (*Miss Cutler*, May, 1850).

Geogr. Dist. —— ?

Description. — "Filaments forming continuous tufts, excessively slender and delicate (like those of *Conferva bombycina*), soft, curved, but not twisted, articulated throughout. In an early stage the filament is confervoid, the cells, which are about as long as, or a little longer than broad, being filled with a pale green endochrome. At a later period this gradually becomes granular, and contracts, no longer filling the tube, and finally it is consolidated into a brilliant bead-like green sporidium. Soon after the membrane bursts, the filaments break up, and the mature fruit is dispersed in the water. Substance somewhat gelatinous, the plant adhering most closely to paper in drying."—*Phyc. Brit.*

This pretty little species, we are informed by its author, was discovered by Miss Cutler, to whose memory he has dedicated the name. We have not seen the species, but from the beautiful figure and descriptions in *Phycologia Britannica* it appears quite distinct, although closely allied to the three preceding species. It is seldom a lady so well deserving of notice obtains it, for in addition to this specific baptism, Dr. Greville has inscribed a genus to her name. Had we it in our power, we would add a third, for her kindness to us, in specimens, &c., has been unremitting.



LYNGBYA CUTLERIÆ.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Tuft of *Lyngbya Cutleriæ*, natural size.
2.—Filaments.
3.—Portion of same. Both magnified.

MICROCOLEUS ANGUIFORMIS.—*Harv.*

Gen. Char.—Filaments excessively minute, transversely striated, enclosed within membranous sheaths from which they vividly oscillate. Name from μικρὸς, "small," and κολεὸς, "a sheath."

Microcoleus *anguiformis*.—Filaments excessively minute, cylindrical, obtuse, enclosed in a horn-shaped curved sheath, the closed end tapering to a point.

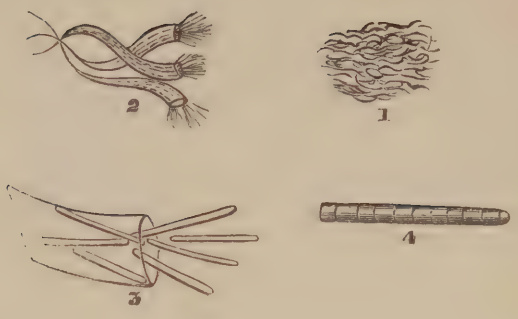
Microcoleus *anguiformis*.—*Harv. MSS.*; *Hass. Fr. Water Alg.* p. 261, t. 70, f. 1; *Harv. P. B.* plate 249; *Harv. Man.* p. 227; *Harv. Syn.* p. 197; *Atlas*, plate 78, fig. 371.

Hab.—Pools of brackish water near the shore at Dalgelly (*Mr. Ralfs*); Ayrshire (*Dr. Dickie*); near Montrose (*A. Croall*).

Geogr. Dist.—As above; —— ?

Description.—Plants forming a thin, often extensive stratum of a dark green colour, more frequently, however, mixed with other *Confervæ*. Sheaths very minute, thin, transparent, gradually tapering from the one end to a narrow point at the other, repeatedly curved. Filaments extremely minute, numerous, cylindrical, obtusely rounded at both ends, transversely striated as if jointed, vividly oscillating from the large and open end of the tube, or from any accidental rupture in its side.

This curious and minute plant differs only from the *Oscillatoriæ* in having the filaments enclosed in a sheath, separate from which they would be at once referred to that genus. "As the plant advances the sheath widens, and is then found full of a multitude of filaments. These oscillate like those of an *Oscillatoria*, either from the wide mouth of the sheath, or from any accidental rupture which may happen in its side." We have seldom met with them alone, but mixed with other *Confervæ* on moist muddy banks above high-water mark. The sheaths generally lie on the surface, but the narrow end is generally of a yellowish hyaline colour, and led us to suppose that they might be thereby fixed in an earlier stage; perhaps, however, it might only be discoloured from incipient decay, being, probably, the first part formed.



MICROCOLEUS ANGUIFORMIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Microcoleus anguiformis*, natural size.
2.—Portion of same.
3.—Apex.
4.—Portion of a filament. All magnified.

OSCILLATORIA LITTORALIS.—*Carm.*

Gen. Char.—"Filaments lying in a mucous matrix, rigid, simple, acicular, vividly oscillating; tube continuous; endochrome green, densely annulated with close, parallel, transverse striæ."—*Phyc. Brit.* *Oscillatoria* (*Vauch.*), referring to the motion observed in most of the species, resembling the oscillations of a pendulum.

Oscillatoria *littoralis.* — "Stratum of a vividly æruginous green colour; filaments thick, dark green, variously curved; striæ conspicuous, close set."—*Phyc. Brit.*

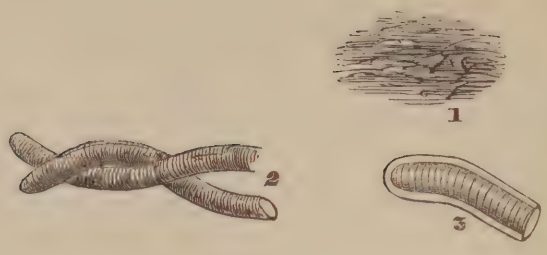
Oscillatoria *littoralis.*—*Carm. Alg. Appin.* ined.; *Harv.* in *Hook. Brit. Fl.* vol. ii. p. 375; *Harv. P. B.* plate 105 a.; *Harv. Man.* p. 228; *Harv. Syn.* p. 197; *Atlas*, plate 78, fig. 372.

Hab.—In pools, along the muddy sea-shore, flooded by spring-tides. Appin (*Capt. Carmichael*).

Geogr. Dist. —— ?

Description. — "Stratum exceedingly thin, slimy, bullated by the extrication of air-bubbles, of a dark green colour, spreading to an indefinite extent over the muddy bottom of the pool. Filaments one to two lines long, much thicker than those of *O. nigra*, straight or slightly curved, radiating very irregularly, and generally in twisted bundles. Striæ strongly marked at intervals of about one-third the diameter of the filament."—*Carmich.* l. c. in *Phyc. Brit.*

One of the many discoveries of the late Captain Carmichael, to whom we are greatly indebted for many discoveries among the minute marine Algæ, to the study of which he devoted himself with great energy and success. We have not met with the present species, and only know it by the above descriptions and the accompanying figures. The filaments, it seems, are found curved and twining together; the striæ very dense, and the mass of the endochrome divided at uncertain intervals into portions, which probably break off eventually, and become new filaments.



OSCILLATORIA LITTORALIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Oscillatoria littoralis*, natural size.
2.—Portion of filaments.
3.—Apex of same. Both magnified.
(Reduced from *Phyc. Brit.*)

OSCILLATORIA SPIRALIS.—*Carm.*

Gen. Char.—"Filaments lying in a mucous matrix, rigid, simple, acicular, vividly oscillating; tube continuous; endochrome green, densely annulated with close, parallel, transverse striæ."—*Phyc. Brit.* *Oscillatoria* (*Vauch.*), referring to the motion observed in most of the species, resembling the oscillations of a pendulum.

Oscillatoria *spiralis.*—Filaments very slender, spirally twisted, and radiating in all directions, forming often extensive strata of a dark green colour, very thin and slightly lubricous.

Oscillatoria *spiralis.*—*Carm. Alg. Appin.* ined.; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 377; *Harv. P. B.* plate 105 B.; *Harv. Man.* p. 228; *Harv. Syn.* p. 198; *Atlas*, plate 79, fig. 373.

Oscillatoria *subsalsa.*—*Harv.* l. c. p. 376; *Harv. Man.* 1st edit. p. 165.

Spirillum *rupestre.*—*Hass. Fresh Water Algæ*, p. 277, t. 75, f. 6.

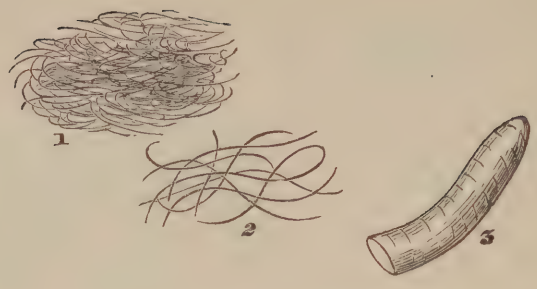
Hab.—On rocks by the sea-side, above and between tide-marks. Not uncommon.

Geogr. Dist.—Coasts of France.

Description.—This forms very thin dark green, at length somewhat rusty coloured strata, slightly lubricous, sometimes of considerable extent. Filaments very slender, very much curved or twisted in a short spiral, and crossing and interlacing in every direction, cylindrical, of equal diameter throughout, both extremities rounded and obtuse; striæ rather distant, very obscure.

This species seems to prefer the vicinity of decaying animal or vegetable matter, being generally found on rotten wood on the rocks under roosting places of sea-fowl, probably not uncommon. The stratum is but very slightly lubricous, and does not very closely adhere to the rock, peeling off in thin paper-like flakes when it becomes dry, and has then but little gloss, and not much tenacity.

Specimens from the south of England are of a much brighter colour, and the stratum thinner than in the Scotch specimens we have met with. The microscopic characters are, however, identical.



OSCILLATORIA SPIRALIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Oscillatoria spiralis*, natural size.
2.—Filaments.
3.—Apex of a filament. All magnified.

OSCILLATORIA NIGRO-VIRIDIS.—*Thwaites.*

Gen. Char.—"Filaments lying in a mucous matrix, rigid, simple, acicular, vividly oscillating; tube continuous; endochrome green, densely annulated with close, parallel, transverse striæ."—*Phyc. Brit.* *Oscillatoria* (*Vauch.*), referring to the motion observed in most of the species, resembling the oscillations of a pendulum.

Oscillatoria *nigro-viridis.* — "Stratum of a very dark olive green colour; filaments delicate pale green, rigid, with obtuse curved apices; striæ inconspicuous, distant about half a diameter of the filament; endochrome very slightly granulose."—*Phyc. Brit.*

Oscillatoria *nigro-viridis.*—*Harv. P. B.* plate 251 A.; *Harv. Man.* p. 229; *Harv. Syn.* p. 198; *Atlas*, plate 79, fig. 375.

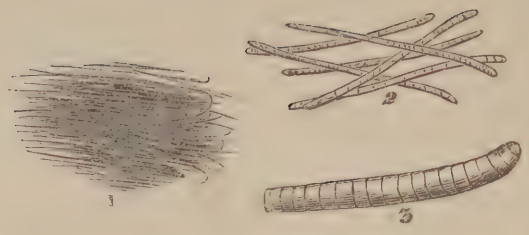
Hab.—In a brackish ditch at Shirehampton near Bristol, Aug. 1847 (*Mr. G. H. K. Thwaites*). Summer and autumn. Not uncommon.

Geogr. Dist. —— ?

Description.—"Stratum thin, of a dark olive green, almost black colour, growing upon the mud, and subsequently floating in large masses. Filaments of a pale dull green colour, with obtuse, distinctly curved, scarcely attenuated apices; striæ not conspicuous, distant from each other about half a diameter of the filament. Endochrome scarcely granulose."—*Phyc. Brit.*

We have met with this species occasionally, and consider it not at all uncommon, but have no specimens preserved, and have been obliged to copy the very characteristic descriptions from *Phycologia Britannica.* It forms dark green strata on damp mud, becoming firm and somewhat glossy when dry, and on the return of the water, it penetrates below, before softening the crust, which then gets loose, and is forced up by the air underneath it and floats on the surface.

This species bears a considerable resemblance to *Oscillatoria uncinata* of Kütz.; but this is a smaller species than ours, and has the striæ of its filaments more distinctly marked.



OSCILLATORIA NIGRO-VIRIDIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Oscillatoria nigro-viridis*, natural size.
2.—Portion of filaments.
3.—Apex of a filament. Both magnified.
(Partly reduced from *Phyc. Brit.*)

OSCILLATORIA SUBULIFORMIS.—*Thwaites.*

Gen. Char.—"Filaments lying in a mucous matrix, rigid, simple, acicular, vividly oscillating; tube continuous; endochrome green, densely annulated with close, parallel, transverse striæ."—*Phyc. Brit.* *Oscillatoria* (*Vauch.*), referring to the motion observed in most of the species, resembling the oscillations of a pendulum.

Oscillatoria *subuliformis.*—Filaments very slender, subuliform, of a bright green colour, forming thin strata of a very deep dark green; striæ scarcely apparent, rather distant.

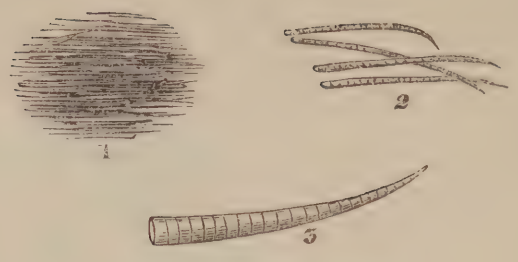
Oscillatoria *subuliformis.*—*Harv. P. B.* plate 251 B.; *Harv. Man.* p. 229; *Harv. Syn.* p. 198; *Atlas*, plate 79, fig. 376.

Hab.—In brackish ditches at Shirehampton near Bristol (*Mr. G. H. K. Thwaites*). Summer and autumn. Not uncommon.

Geogr. Dist. —— ?

Description.—Stratum covering the mud with a deep dark green colour, often of considerable extent, at length separating and raised to the surface by means of air-bubbles. Filaments very slender, cylindrical, straight, tapering towards the apices, which are much curved in an awl-shaped manner; the striæ are very indistinct and distant, rather more than half the diameter. Endochrome scarcely granular.

This seems to be rather a common species, forming strata, sometimes of considerable thickness and extent, on the soft mud, from which it is easily disengaged, and rising to the surface, floats readily by means of the air-bubbles which it contains. It is closely allied to the last, but readily distinguished by its more tapered but rather obtusely-pointed awl-shaped apices.



OSCILLATORIA SUBULIFORMIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Oscillatoria subuliformis*, natural size.
2.—Portion of filaments.
3.—Apex of a filament. Both magnified.

OSCILLATORIA INSIGNIS.—*Thwaites.*

Gen. Char.—"Filaments lying in a mucous matrix, rigid, simple, acicular, vividly oscillating; tube continuous; endochrome green, densely annulated with close, parallel, transverse striæ."—*Phyc. Brit. Oscillatoria* (*Vauch.*), referring to the motion observed in most of the species, resembling the oscillations of a pendulum.

Oscillatoria *insignis.*—Filaments of a fine olive brown, rather stout, straight, slightly curved at the obtuse ciliated apices, forming a dark brown stratum, spreading over the mud.

Oscillatoria *insignis.*—*Harv. P. B.* plate 251 c.; *Harv. Man.* p. 229; *Harv. Syn.* p. 199; *Atlas*, plate 79, fig. 377.

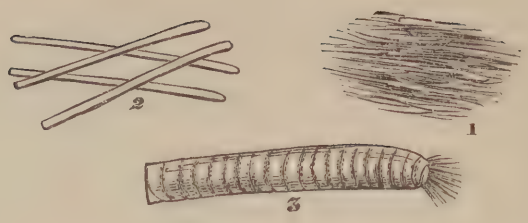
Hab.—In a brackish ditch at Shirehampton near Bristol, Nov. 1848 (*Mr. G. H. K. Thwaites*). Summer and autumn. Not uncommon.

Geogr. Dist. —— ?

Description.—Stratum very thin, of a dark blackish brown colour, spreading in every direction, greenish brown, and scarcely glossy when dry. Filaments of considerable thickness, straight or slightly curved at the apex, cylindrical, and of equal diameter throughout, slightly tapering at the apex, which is obtuse and ciliated; striæ distinctly marked, lined on each side by a stratum of granular endochrome, distant about one-third of the diameter. Substance rather rigid and brittle. Colour, a pale greenish brown in the microscope, in the mass, dark blackish brown.

A beautiful species, and perhaps not uncommon, but so little attention has hitherto been paid to these curious but interesting objects, that a careful study will no doubt be rewarded by the discovery of additional species, and a great extension of their geographical range. The present is not a conspicuous species, the colour not differing much from that of the damp mud on which its filaments are rather thinly strewn.

"The cilia terminating the filaments of this species, after careful observation, are proved to have no proper motion of their own, and consequently can exercise no agency on the movements of the filaments; they appear to be mere appendages, and to perform no important function in the economy of the plant."—*Thwaites.*



OSCILLATORIA INSIGNIS.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Oscillatoria insignis*, natural size.
2.—Portion of filaments.
3.—Apex of a filament. Both magnified.

SPIRULINA TENUISSIMA.—*Kütz.*

Gen. Char.—"Filaments lying in a mucous layer, rigid, simple, and spirally twisted, vividly oscillating; tube continuous; endochrome green, more or less distinctly annulated. *Spirulina* (Turp.) a diminutive of *spira*, 'a twist or curl.'"—*Phyc. Brit.*

Spirulina *tenuissima.* — Filaments extremely slender, somewhat flexuous, cylindrical, obtuse, closely twisted in a spiral form, forming a thin bluish green stratum.

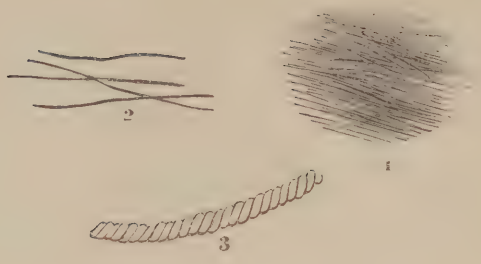
Spirulina *tenuissima.*—*Kütz. Phyc. Gen.* p. 183; *Ralfs*, in *Ann. Nat. Hist.* vol. xvi. p. 309, plate 10; *Harv. P. B.* plate 105 c.; *Harv. Man.* p. 229; *Harv. Syn.* p. 199; *Atlas*, plate 79, fig. 374.

Hab.—On decaying Algæ, and on sticks in brackish pools. Near Dolgelly (*Mr. Ralfs*); Aberdeen (*Dr. Dickie*).

Geogr. Dist.—Europe?

Description.—Stratum at first thin, at length rather thick, tough and lubricous, of a bright green colour, brownish when old. Filaments excessively slender, straight or slightly curved, cylindrical, of equal diameter throughout, twisted into a close spiral; apices obtuse. Substance soft and lubricous. Colour, a rich brassy green, browner when old.

A beautiful species. Our specimens were collected near Aberdeen by Dr. Dickie. It does not seem to be very common, frequenting decaying Algæ and other vegetables, perhaps indiscriminately, and may, like many others, be often overlooked or passed by for some other species.



SPIRULINA TENUISSIMA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Spirulina tenuissima*, natural size.
2.—Filaments.
3.—Portion of same. Both magnified.

MONORMIA INTRICATA.—*Berk.*

Gen. Char.—Filaments enclosed in a branching gelatinous matrix resembling a frond, rolled up in a wide spiral, consisting of spherical cells, arranged in a moniliform manner, and here and there interrupted by a cell different in size and form from the rest. "Spores formed from the ordinary cells." Name from *μονός*, "one," *ὅρμος*, "a necklace."

Monormia *intricata.*—The only species.

Monormia *intricata.*—*Berk. Gl. Brit. Alg.* p. 46, t. 18; *Hass. Brit. Fresh Water Algæ*, p. 285, plate 75, f. 11; *Harv. P. B.* plate 256; *Harv. Man.* p. 231; *Harv. Syn.* p. 200; *Atlas*, plate 79, fig. 378.

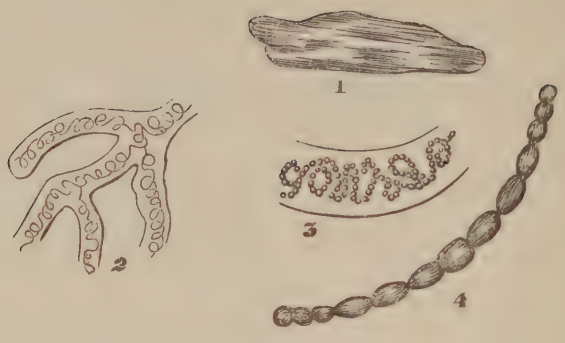
Hab.—At Gravesend, in ditches of the marsh to the south of the Frindsbury Canal, in great abundance, June, 1832 (*Rev. M. J. Berkeley*); ditch (brackish) near Lighthouse, Shirehampton, Bristol (*Mr. G. H. K. Thwaites*).

Geogr. Dist. —— ? Not known out of England.

Description.—"Forming small roundish gelatinous masses, floating among different species of *Lemna* in fresh water, but probably within the influence of the tide, and also amongst *Enteromorpha intestinalis*, and even within its frond, in brackish water. The plant is at first of an olive yellow, gradually assuming a greener tint, and when dried of a deep verdigris. Very gelatinous, delicately branched; the branches very flaccid. Under a high magnifier the whole plant is evidently composed of gelatine, in the centre of which runs a single moniliform filament, following the ramifications, and in its progress curling to and fro repeatedly across the thread; the joints being nearly globular.—*Berk.* in *Phyc. Brit.* The filament is here and there at unequal distances interrupted by a paler cell of a subquadrate form, the cells next which are first converted into spores, until at length all are so converted; they are then larger, and of a fine umber brown colour. "If these simply organised plants have sexes, the functions of the male probably reside in these quadrate cells."—*Phyc. Brit.*

We have only seen dried specimens of this curious plant. They were from near Gravesend, where the plant is said still to be plentiful, at least in certain seasons.

The most beautiful perhaps of all the *Nostochineæ* as well as the most delicate, forming roundish, irregular, or more or less regularly branching, soft gelatinous masses, floating freely in the pools and ditches which it frequents.



MONORMIA INTRICATA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—Frond, natural size.
2.—Same, magnified.
3.—Portion, greatly magnified.
4.—Same, very highly magnified.
(Partly reduced from *Phyc. Brit.*)

SPHÆROZYGA CARMICHAELII.—*Harv.*

Gen. Char.—"Filaments free, simple, moniliform, consisting of a series of ordinary cells interrupted here and there by a cell of a different kind (connecting cell), which is generally of a larger size and often ciliated."—*Thw.* "Spores formed from the ordinary cells."—*Phyc. Brit.* Name from σφαῖρα, "a sphere," and ζυγὸς, "a yoke."

Sphærozyga *Carmichaelii.*—"Spores large, oblong, twice or thrice as long as broad, commencing to be formed from the cells nearest the connecting one."—*Thw.* in lit. in *Phyc. Brit.*

Sphærozyga *Carmichaelii.*—*Harv. P. B.* plate 113 A.; *Harv. Man.* p. 232; *Harv. Syn.* p. 200; *Atlas*, plate 80, fig. 379.

Belonia *torulosa.*—*Carm. Alg. Appin.* ined.; *Harv.* in *Hook. Br. Fl.* vol. ii. p. 379; *Harv. Man.* 1st edit. p. 167.

Anabina *marina.*—*Breb.* in *An. Sc. Nat.*

Hab.—On decaying heaps of marine Algæ, also in brackish ditches. Summer. Not uncommon.

Geogr. Dist.—Probably throughout Europe.

Description.—Plants forming a thin gelatinous stratum, spreading over decaying Algæ, of a pale, almost hyaline colour, scarcely tinged with green. Filaments slightly curved, moniliform, scarcely a quarter of a line in length, middle joints the largest, those on each side of the connecting cell gradually becoming larger, more ovate-oblong, changing to a greenish brown when mature.

This singular plant seems not unfrequent in greater or less abundance on decaying Algæ in autumn or in damp weather, forming a ropy or gluey-like gelatinous thin coat, spreading over their surface.

SPHÆROZYGA CARMICHAELII.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Sphærozyga Carmichaelii,* natural size.
2.—Filaments.
3.—The same. Both magnified.
(Reduced from *Phyc. Brit.*)

SPHÆROZYGA THWAITESII.—*Harv.*

Gen. Char.—"Filaments free, simple, moniliform, consisting of a series of ordinary cells interrupted here and there by a cell of a different kind (connecting cell), which is generally of a larger size, and often ciliated."—*Thw.* "Spores formed from the ordinary cells."—*Phyc. Brit.* Name from σφαῖρα, "a sphere," and ζυγὸς, "a yoke."

Sphærozyga *Thwaitesii.*—"Spores elliptical, once and a-half as long as broad, commencing to be formed from the cells most distant from the ciliated (connecting) one."—*Thw.* in litt. in *Phyc. Brit.*

Sphærozyga *Thwaitesii.*—*Harv. P. B.* plate 113 B.; *Harv. Man.* p. 232; *Harv. Syn.* p. 201; *Atlas*, plate 80, fig. 380.

Anabina *Thwaitesii.*—*Harv. MS.*

Hab.—On the muddy sides of ditches of brackish water; also floating. Dolgelly (*Mr. Ralfs*); Shirehampton, near Bristol (*Mr. G. H. K. Thwaites*); Porbury, Somerset (*Mr. Broome*); Belfast Bay (*Dr. Dickie*).

Geogr. Dist. —— ? Probably in similar situations to the above throughout Europe.

Description.—Stratum of a bright deep green colour, widely spreading, very thin and gelatinous, closely adhering to paper. Filaments extremely slender, curved, twisted, and interwoven, moniliform; cells equal, spherical, at length oval oblong; connecting cell large, twice the diameter of the others, ciliated, slightly elliptical. Colour of the filaments pale greenish in the microscope.

This forms beautiful intensely green strata of considerable extent on soft muddy soil, where the water is somewhat stagnant, at length occasionally rising from the surface and floating.

SPHÆROZYGA THWAITESII.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Sphærozyga Thwaitesii*, slightly magnified.
2, 3.—Filaments. Both magnified.

SPHÆROZYGA BROOMEI.—*Thwaites.*

Gen. Char.—"Filaments free, simple, moniliform, consisting of a series of ordinary cells interrupted here and there by a cell of a different kind (connecting cell), which is generally of a larger size, and often ciliated."—*Thw.* "Spores formed from the ordinary cells."—*Phyc. Brit.* Name from σφαῖρα, "a sphere," and ζυγὸς, "a yoke."

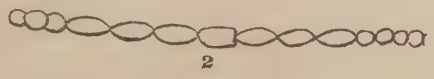
Sphærozyga *Broomei.*—"Spores numerous, elliptical, twice as long as wide, not much exceeding in width the ordinary cells, commencing to be formed from the cells nearest the connecting cells; connecting cells smooth, subquadrate, rather longer than wide."—*Thw. MSS.* in *Phyc. Brit.*

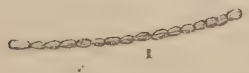
Sphærozyga *Broomei.*—*Harv. P. B.* plate 173 A.; *Harv. Man.* p. 233; *Harv. Syn.* p. 201; *Atlas*, plate 80, fig. 382.

Hab.—On dead leaves on *Myriophyllum*, &c., in a brackish ditch at Shirehampton, near Bristol, June (*Mr. G. E. Broome*, and *Mr. G. H. K. Thwaites*).

Geogr. Dist. ——?

This species is named in honour of Mr. G. E. Broome, "an excellent Cryptogamic botanist, who first detected the species," and a friend of Mr. Thwaites.





SPHÆROZYGA BROOMEI.

EXPLANATION OF DISSECTIONS.

Figs. 1 and 2.—Filaments of *Sphærozyga Broomei*, both magnified.

SPHÆROZYGA BERKELEYANA.—*Thwaites.*

Gen. Char.—"Filaments free, simple, moniliform, consisting of a series of ordinary cells, interrupted here and there by a cell of a different kind (connecting cell), which is generally of a larger size, and often ciliated."—*Thw.* "Spores formed from the ordinary cells."—*Phyc. Brit.* Name from σφαῖρα, "a sphere," and ζυγὸς, "a yoke."

Sphærozyga *Berkeleyana.*—"Spores large, twice the size of the ordinary cells, oblong, half as long again as wide, becoming brown when mature, generally two on each side of the connecting cell, which is spherical, slightly compressed. Young filaments included, one or several together, in a defined mucous sheath."—*Thw. MSS.* in *Phyc. Brit.*

Sphærozyga *Berkeleyana.*—*Harv. P. B.* plate 173 B.; *Harv. Man.* p. 233; *Harv. Syn.* p. 201; *Atlas*, plate 80, fig. 383.

Hab.—Found amongst the filaments of *Conferva fracta*, &c., in a brackis ditch at Shirehampton, near Bristol, June (*Mr. G. H. K. Thwaites*).

Geogr. Dist.—— ?

This species differs from the others in the young filaments being enclosed at first in a gelatinous sheath, "from which they appear to escape before the spores are mature." It is named in honour of the Rev. M. J. Berkeley, whose acquaintance with Cryptogamic botany is too well known to require any eulogium.

SPHÆROZYGA BERKELEYANA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Frond of *Sphærozyga Berkeleyana*, containing filaments.
2.—Portion of the same. Both magnified.
(Reduced from *Phyc. Brit.*)

SPERMOSIRA LITOREA.—*Kütz.*

Gen. Char.—Filaments slightly mucous, free, simple, cylindrical, enclosed in a very delicate, membranous tube. Cells lenticular; connecting cells larger, compressed. —*Thw.* "Spores formed from the ordinary cells."—*Phyc. Brit.* Name from σπέρμα, "a seed," and σειρὰ, "a chain," referring to moniliform spores.

Spermosira *litorea.*—Filaments rather stout and rigid, straight or slightly curved, of a bright green colour; cells much compressed; connecting cells scarcely larger than the ordinary cells.

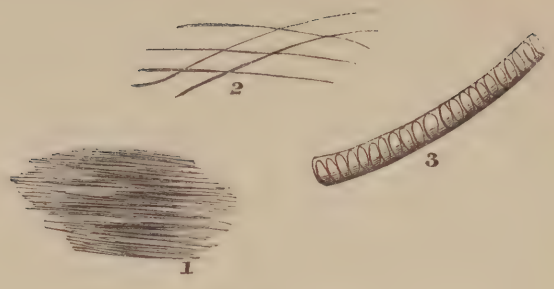
Spermosira *litorea.*—*Kütz. Phyc. Gen.* p. 213; *Harv. P. B.* plate 113 c.; *Harv. Man.* p. 234; *Harv. Syn.* p. 201; *Atlas*, plate 80, fig. 381.

Hab.—In muddy brackish ditches, Barmouth (*Rev. T. Salway*); Dolgelly, &c. (*Mr. Ralfs*); Shirehampton (*Mr. G. H. K. Thwaites*).

Geogr. Dist. —— ? Probably throughout Europe in similar situations.

Description.—Filaments attached to floating plants, on which they form rather a harsh, rigid stratum of a fine rich deep bluish green colour, changing to brown in age; straight or sometimes slightly curved, cylindrical, of equal diameter throughout. Ordinary cells much compressed, length scarcely a third of the diameter, of a pale bluish green, brownish when mature; connecting cells similar, slightly larger, greenish or reddish brown, at very unequal distances.

This very pretty species forms a rigid coating on the stems of floating plants, and is of a beautiful green colour when young, changing to a brownish umber hue when mature. It is only separated from *Sphærozyga* by the presence of the enclosing tube.



SPERMOSIRA LITOREA.

EXPLANATION OF DISSECTIONS, &c.

Fig. 1.—*Spermosira litorea*, natural size.
2.—Filaments, magnified.
3.—Portion of same, greatly magnified.

SPERMOSIRA HARVEYANA.—*Thwaites.*

Gen. Char.—Filaments slightly mucous, free, simple, cylindrical, enclosed in a very delicate, membranous tube. Cells lenticular ; connecting cells larger, compressed. —*Thw.* "Spores formed from the ordinary cells."—*Phyc. Brit.* Name from σπέρμα, "a seed," and σειρὰ, "a chain," referring to moniliform spores.

Spermosira *Harveyana.*—"Filaments much curved, composed of cells nearly as long as broad ; spores exactly spherical, almost twice the diameter of the cells ; connecting cells subquadrate, rather longer than wide, and of the same width as the ordinary cells."—*Thw.* in *Phyc. Brit.*

Spermosira *Harveyana.*—*Thw. MS.* ; *Harv. P. B.* plate 173 c. ; *Harv. Man.* p. 234 ; *Harv. Syn.* p. 202 ; *Atlas*, plate 80, fig. 384.

Hab.—Found intermixed with *Sphærozyga Broomei* at Shirehampton, near Bristol (*Mr. G. H. K. Thwaites*).

Geogr. Dist. —— ?

This beautiful species we have not seen. It has been named by Mr. Thwaites in honour of Professor Harvey, from specimens collected along with *Sphærozyga Broomei*, in brackish ditches near Bristol.

SPERMOSIRA HARVEYANA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Portion of *Spermosira Harveyana*, magnified.
2.—The same, greatly magnified.
(Reduced from *Phyc. Brit.*)

HORMOSPORA RAMOSA.—*Thwaites.*

Gen. Char.—"Filaments gelatinous, confervoid, each enclosing a linear series of oval or spherical cells; endochrome green. Fructification: cells of the filaments enlarged, and become converted into spores. *Hormospora* (Brébisson) from ὅρμος, 'a necklace,' and σπορὰ, 'a seed.'"—*Phyc. Brit.*

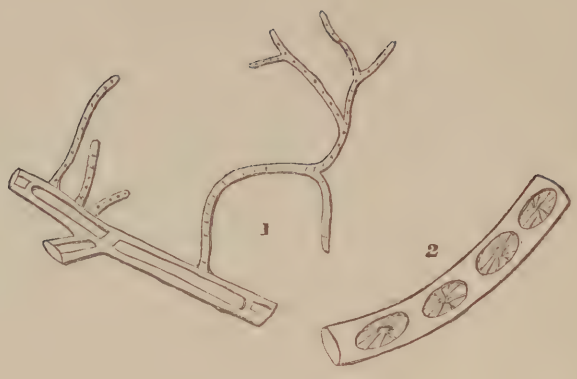
Hormospora *ramosa.*—*Harv. P. B.* plate 213; *Harv. Man.* p. 235; *Harv. Syn.* p. 202; *Atlas*, plate 76, fig. 360.

Hab.—Growing attached to the filaments of *Cladophora fracta*, in a salt-water lake near Wareham, Dorsetshire, August and September (*Rev. W. Smith*).

Geogr. Dist. —— ?

Description.—"Filaments gelatinous, irregularly branched. Cells at first subcylindrical, and closely coherent; subsequently becoming ovate and distinct. Endochrome pale green, radiating from a central nucleus. Filaments at length resolved into separate spores, each of which is surrounded by a considerable amount of gelatine."—*Phyc. Brit.*

This very pretty species we have never seen, and only know from the beautiful figures and description in *Phycologia Britannica*. It has, perhaps, little claim to be considered a marine species, but as it may often be met with by sea-side botanists, it may not be out of place to notice it in works on Marine Botany.



HORMOSPORA RAMOSA.

EXPLANATION OF DISSECTIONS.

Fig. 1.—Fronds on an aquatic plant.
2.—Portion of same. Both magnified.
(Reduced from *Phyc. Brit.*)

ADDENDA.

Stenogramme *interrupta*, Mont.—Dredged in Strangford Loch (*Dr. G. Dickie*, June, 1858); the most northern point in its distribution of which we have heard. Plants small, but fruited.

Catenella *opuntia*, Grev.—Inverness Frith, March, 1860.

Griffithsia *setacea*, Ag.—With us (Forfarshire) this plant is certainly annual, appearing in April or May, and being all gone by September. It prefers the deep and most sheltered rock-pools, as its slender and fragile stems are but ill-fitted to withstand the buffeting of the billows.

Himanthalia *lorea*, Lyngb.—We have no doubt that this species is perennial. In October last (1859), we paid particular attention to ascertain this point. The shore was strewed with thongs, both with and without cups, in every direction; and on the rocks which had during the summer been completely covered by them, very few remained, and many of these were so completely battered that only fragments were left. In some places the cracks and crevices were filled with dense hedges of young seedling fronds, in many cases so densely packed together, that they were compressed into the form of hexagonal bodies, the rounded apices of which alone were visible. These, however, we had seen before, and hardly thought worth noting; but on examining the spots whence the old fronds had been removed, we found more interesting subjects for notice. Here were young fronds equally numerous, arising from the scutate base of the old frond, and round the point from which that had lately been torn away. Old cups also were still numerous: worn and battered they were certainly, some of them almost to the base; yet on these also the renewing process had commenced, and from the interior of not a few the young thongs had already commenced to spring. We even observed several old cups, to which portions of the old thongs were still attached, with young ones half an inch high arising at their base. For these facts we were prepared, and had partially anticipated them, but the following was quite unexpected. From many of the fronds the thongs were partially eroded: some had lost the tips, others were half gone, while some of them were more or less eroded throughout their whole length; to renew these, all attempts would certainly be useless, as they are perforated to the core in all directions by the now empty conceptacles. No sooner, however, has the process of erosion proceeded beyond the point where the conceptacles commence, than the reconstruction of a new thong commences; and we met with several instances in which this process of reconstruction had already reached to a distance of about half an inch. One of these is now before us, and even in the dried state shows the new growth quite distinctly. It would therefore appear that the crustaceous base of the frond, the cups, and even the base of the thong, are, or at least may often be, perennial, and have the power of producing new plants or receptacles. We have, indeed, not the least doubt that the annual destruction of so many of the fronds is the work of accident, not of design; and indeed, with a plant of such length, of such "a heavy head," and with such a

narrow base, it is rather a wonder that any should remain and survive the storms of autumn and winter, than that a portion of them should be torn off and be found among "the ocean weeds strewn on the surf-beaten shore." When the plants are left by the tide, spores and zoospores are observed on the surface of the receptacles, forming a little heap above the pore or opening of the conceptacle, and are curious and interesting objects for the microscope. It would be very interesting to ascertain whether their being left dry promotes their emission, or whether they are extruded equally under water, but being washed away as they appear, do not accumulate in little heaps as when left dry.

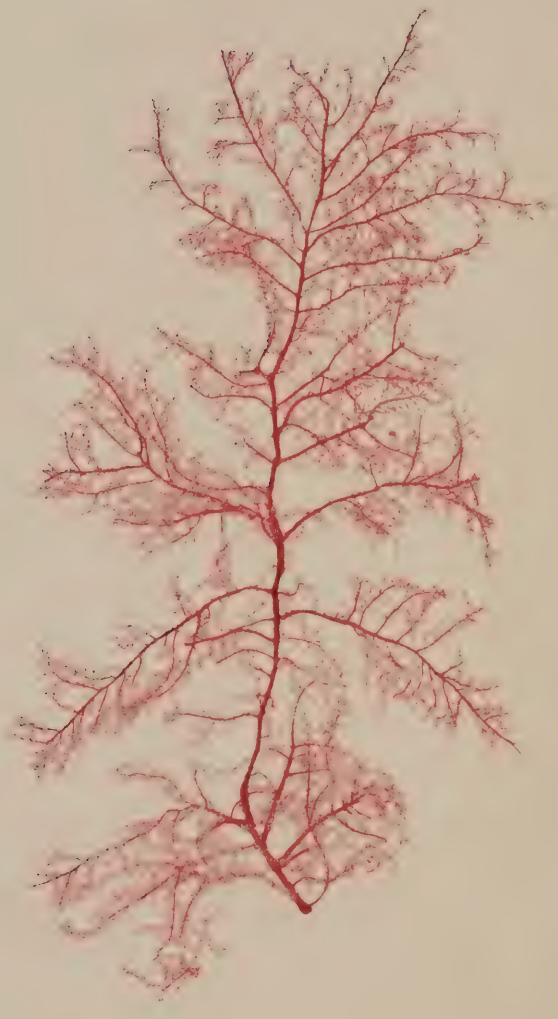
Punctaria *plantaginea*, Grev.—The brownish colour of this plant soon changes to an olive-green after being gathered, and that without being exposed to the light; so that a handful put in the collecting-box will be found in an hour or two to have changed to a greenish olive, especially those parts which have been in contact. The same change of colour generally takes place in drying; contrary, however, to what is generally the case, this change does not take place so readily in old plants as in young.

Enteromorpha *intestinalis*, Link, and *compressa*, Grev.—The more we study these two plants or forms, the more are we convinced of the difficulty, if not impossibility, of arranging satisfactory characters to them. If we assume it as an axiom (for the contrary admits of more easy demonstration), that *E. intestinalis* is the name to be applied to those specimens that are *unbranched* and *attenuated* to the base, then nothing could be more easy, for these are characters easily observed and readily appreciable; unfortunately, however, they are not applicable to practice, as the very first pool perhaps that we examine will supply us with specimens both with and without branches, which no one would hesitate to pronounce one and the same species. The branching is in general most abundant near the base, but scattered branches are not unfrequent even to the summit of the frond.

Polysiphonia *parasitica*, Grev.—We have specimens of this gem sent us by Dr. Brady, and gathered by him on the Northumberland and Durham coasts. They are quite as fine as the Ayrshire specimens, an inch and a-half across. From the same quarter we received specimens of *Ceramium flabelligerum* and *Callithamnion arbuscula*.

Callithamnion *floccosum*, Ag.—We had the pleasure to receive some fine specimens of this species (just in time to be too late for the Plate in our Second Volume), gathered by our kind friend Mr. Bell, of Peterhead, there; the specimens are clothed with favellæ, so that they are the first so found in this country.

Porphyra *laciniata*, Ag.—So sensible is this species to the changes of temperature and moisture, that it may be called the "Sensitive Plant" of the sea. It does not adhere well to paper, and when dried, if exposed to the air, its edges immediately curl up from the sheet. If the finger is then brought near the edge, placing it parallel with the margin and within an inch of the frond, the edges of the frond will at once recoil, until flat on the paper, rising again as the finger is withdrawn, but again recoiling as the finger approaches: the action taking place at a greater or less distance of the finger, according to the degree of warmth and moisture of the hand.



Nitophyllum hypnoides, J.G.

Nature Printed by Henry Bradbury.

NACCARIA HYPNOIDES.—*Ag.*

This species we have received from Mr. F. P. Girdlestone, of Jersey, but none of them are in fruit, at least not so developed as to enable us to make drawings. We therefore in the meantime give a Nature-print of this species, reserving till a future time a more detailed notice of it (as well as some other new species (?) preserved in our Herbarium). Mr. Girdlestone states that he always finds this species floating, not attached to anything; and sometimes as many as half a dozen specimens at a time.

Short Descriptions of some New British Algæ.

LEATHESIA CRISPA.

Frond subglobose or irregularly tubercular, small, olivaceous, firm, and solid; medullary threads very densely crowded, empty, dichotomous, with very long articulations; peripheric ramelli club-shaped, incurved or arcuated, submoniliform; the articulations about as long as broad, unequally constricted at the nodes; spores pyriform.

Growing on *Chondrus crispus* in the Clyde, at Cumbrae, April, May, and June, 1853 (*Roger Hennedy*).

Fronds one to four lines in diameter, globose, at length irregularly shaped and confluent, of a very firm and dense substance, always perfectly solid. Mr. Hennedy, who watched the plant carefully for a period of three months from its first discovery, remarks that he can always distinguish it from the young of *L. tuberiformis* by its firm and solid character, by merely applying a finger and thumb to the little frond. Under the microscope it is readily known by its curled apical filaments, or peripheric ramelli, which are unequally constricted at the nodes, being crenate along the outer edge of the filament, and even along the inner; but are not regularly moniliform as they are in *L. tuberiformis* and *L. umbellata*.

Fig. 1.—*Leathesia crispa*, growing on *Chondrus crispus*, natural size.
2.—Part of a filament, with its curled apical ramelli.
3.—Ramellus and spore. Both magnified.

ELACHISTA GREVILLII.—*Arn.*

Tufts pencilled, filaments somewhat rigid, elongate, slender, cylindrical, slightly narrowed at the base, and scarcely attenuate at the apex; lower articulations shorter than their diameter, upper as long as broad; tubercle minute.

On *Cladophora rupestris*, at Largs (*Dr. Greville*, July 1, 1852), and at Carrighills, Arran (*Prof. W. Arnott*), the same year.

Similar in many respects to *E. fucicola*, but smaller, with shorter joints, and arising from a much smaller tubercle. It is remarkable, too, for its habitat, growing on one of the Chlorospermatous Algæ, whose fronds it infests often as densely as *C. fucicola* does those of the *Fuci*. The habitat of this species seems sufficiently to refute an opinion which has sometimes been maintained, that the *Elachistæ* are merely abnormal cellular growths of the plants on which they are found. Such an inference might appear plausible in the case of species growing on the *Fuci* or the *Dictyoteæ*, whose cells are of a similar character; but the difference between the cells of *Cladophora rupestris* and those of the parasite are too great to allow of their being confounded. Other characters apart, then, the habitat of the present little Alga induces me to give it a local habitation and a name.

Fig. 1.—*Elachista Grevillii*, growing on *Cladophora rupestris*, natural size.
2.—Portion of tuft.
3.—Apex and base of a filament. Both magnified.

CRUORIA PELLITA.—*Fries.*

Crust of indefinite extent, dark-red brown; filaments much branched below, dichotomous, and somewhat corymbose above, attenuated upwards; tetraspores lateral, zonate, fusiform.

CRUORIA *pellita.*—*J. Ag. Sp. Alg.* vol. ii. p. 491; *Aresch.* in *Linnæa,* xvii. p. 267, tab. 9, figs. 7, 8.

CHÆTODERMA *pellita.*—*Kütz. Phyc. Gen.* p. 326 (not *C. pellita* of *Harv. Phyc.* t. 117).

On rocks, &c., between tide-marks, on several parts of the coast; Miltown-Malbay, 1831 (*W. H. H.*); Sound of Jura (*Prof. Walk. Arnott*); Cumbrae (*R. H.*).

This forms a scab-like, tough, dark-brown or reddish crust on the surface of rocks, to which it adheres very closely. The crust is wholly composed of vertical filaments, which are much branched, and robust at the base, and gradually taper upwards, becoming less frequently divided, and more regularly dichotomous. Large zonate spores of dark-red colour, ellipsoid or fusiform, often much pointed, are found hidden among the filaments, and are formed by the transformation of one of the branches.

"In the *P. B.* I have figured a very different plant, namely, *Petrocelis cruenta* (*J. Ag.*) under the name *Cruoria pellita.* Both form crusts on the rocks, and to the naked eye are undistinguishable. Under the microscope, however, the *Petrocelis* is seen to be formed of simple filaments, having when in fruit a single cruciate tetraspore formed in the middle of each filament; while the *Cruoria* now described consists of much-branched filaments, bearing zonate tetraspores. The figure given in *P. B.* t. 117, represents the half-ripe state of the *Petrocelis;* in ripe specimens the large central cell becomes a tetraspore."

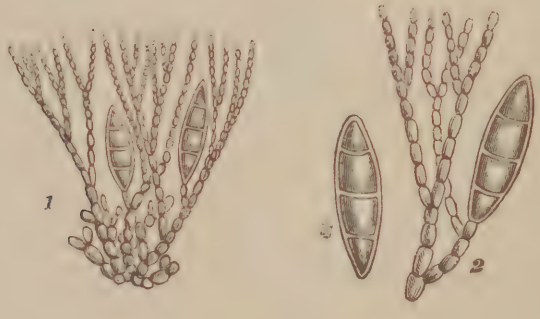


Fig. 1.—Part of the crust of *Cruoria pellita.*
2.—Portion of a filament.
3.—A tetraspore. All magnified.

CRUORIA ADHÆRENS.—*J. Ag.*

Crust of indefinite extent, brown-red or olivaceous; filaments parallel, sparingly dichotomous, attenuated upwards; tetraspores lateral, zonate.

J. Ag. Sp. Alg. vol. ii. p. 491.

On rocks between tide-marks, in various places; Kilcraggan, opposite Gourock (*Prof. Walk. Arnott*); Aberdeen (*Dr. Dickie*); Penzance (*Mr. Ralfs*); Kilkee, 1844; Cushendall, Co. Antrim, 1850 (*W. H. H.*).

Very similar to the preceding, but with less branched threads. Dr. A. communicates specimens with tetraspores. I have also received from Dr. A. a *Cruoria* (?), which is figured in our Plate XIII. c, but which I am uncertain whether to describe as a new species, or perhaps the type of a separate genus, under the name *C. Arnottii*, or to regard as the cystocarpal state of *C. adhærens*. The filaments are sub-simple, or sparingly dichotomous, as in *C. adhærens*, but are of a smaller diameter, with shorter articulations. But the remarkable character consists in the fructification, which is a large terminal pyriform green (!) spore, surrounded by a wide gelatinous limbus.

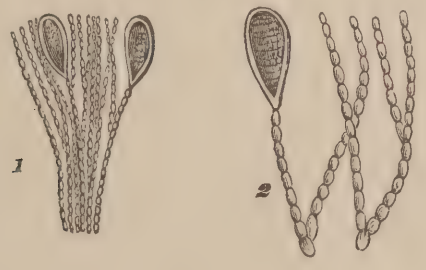


Fig. 1.—Some of the threads as they lie in the stratum.
2.—Some separated, with a spore, more highly magnified.

The cystocarpic fruit of all the genera of the group, which differ from each other in the evolution of their tetraspores, remains to be discovered.

SKETCH

OF THE

HISTORY OF BRITISH SEA-WEEDS.

The ancient history of Algology is a story that is soon told. The ancients, indeed, seem to have held sea-weeds in profound contempt,—at least such of them as they knew,—as they may reasonably be supposed to have been only acquainted with the more common species, and these only as far as their external forms were concerned. Horace, when adverting in his Fifth Satire to the schemes of unscrupulous ambition, says—

"Et genus, et virtus, nisi cum re, vilior alga est."

Literally, "Family and virtue, without wealth, are more worthless even than a sea-weed;" and in his Ode to Ælius he terms it *inutilis alga*, "a thing of no use, absolutely worthless." Nor does the "Prince of Latin Poets" speak in higher terms of our favourite Algæ. Such being the value put upon them by the leading tastes of the "Mistress of the World," we need *not* wonder if they were not held in high esteem by the *profanum vulgus*, who, like "dreaming vassals," are generally too prone to "ape their kings;" and, no doubt, in their contempt of Algæ, as in other things, were ready enough to follow their superiors. We are not aware whether the royal Rabbi naturalist, who wrote on *every plant*, from the cedar of Lebanon to the hyssop that springeth from the wall, knew of them, but if he did, he would, no doubt, like his poetic brethren, not sing sweetly in their praise; more than likely however they were, if at all, only known as "Ocean weeds heaped on the surf-beaten shore," or as things of little beauty, and of less use.

We must not suppose, however, that the ancients lived always in the region of fiction; there were people then as now, who, perhaps, with little time and less opportunity for studying Horace and Virgil, had to learn by experience the value and utility of the objects around them; and no doubt there were persons, who, though unknown to these great

poets, were sometimes glad when they had the opportunity, or when reduced by necessity, to employ sea-weeds for some of the purposes to which they are applied at the present day. Hence we are told by Plutarch, that *algæ immiscuisse herbæ paululum*, &c., "that sea-weed was sometimes dissolved in white wine, and used as a condiment." And A. Hirtius tells us, that *alga e littore collecta, et aquâ dulci eluta, et ida jumentis essurientibus data, vitam eorum producebant*, "in times of scarcity they collected sea-weed from the shore, and having washed it in fresh water, gave it to their cattle, and thus prolonged their lives." It would thus appear that then, as in less ancient times, sea-weed was considered better than *want*, either for man or for beast.

We may now safely pass over a long vista of years in which sea-weeds, if eaten, were not studied. Even the earlier botanists who began to think of arranging the result of their labours into the regular form of a science, seem to have considered them unworthy of notice; so that the immortal Linnæus himself seems scarcely to recognise their existence. Botany was still studied only in connection with medicine and medical plants, or those supposed to be medicinal were alone considered worthy of attention, and the common Coralline and Tang were almost the only species considered worthy of admission into the *Materia Medica*.

A brighter day for Algology, however, was beginning to dawn. The microscope, that handmaid of natural science, was beginning to lend its aid to the enquiring naturalist, and gradually to lead him into a world in which he had not only hitherto been an entire stranger, but in which he was to learn a course of manipulation altogether new, and to become acquainted with forms and facts of which he had formed no idea, and of the existence of which he had never dreamed.

Without the microscope, our knowledge of the sea-weeds never could have reached anything like perfection. Their structure is different from that of land plants, and their forms so variable, and so subject to be influenced by the medium in which they live, that without a knowledge of this structure, we never could have anything even approaching to a certain knowledge of the limits of species. So variable, indeed, are the Algæ in their external forms, especially those of the laminar species, that not the least dependence can be placed on it in the discrimination of the species. For a proof, or at least an example of this, we need go no farther than some of our common species—*Rhodymenia palmata* and *Chondrus crispus* and *mamillosus*, for instance; either of which present such a multiplicity of forms that they become perfectly perplexing even to the experienced collector, even admitting the possibility that there may be more than one species comprehended under some of these troublesome series.

At length a new era began to dawn on the votaries of science. Botany

began to be studied, not only because a few of its subjects were known to be useful in medicine, but because it afforded a most valuable source of training for the mental powers, a pleasing and profitable source of intellectual recreation; but above all of expanding our ideas of the vastness, beauty, and order of the works of creation.

In our short sketch it would be impossible to mention all the valuable contributors who at this time supplied each his mite of information to the general store of knowledge now fast accumulating on this interesting tribe of plants; yet a few stand prominently forward and demand special notice. Ellis and Ray were among the first whose labours were decidedly directed to the object of popularising the study of plants; and although the former was perhaps more of an amateur than of a systematist, he was not therefore the less popular, as it enabled him in everything he did, or thought, or said about his favourite study, to throw around it an irresistible charm of interest and attraction. Lightfoot, Stackhouse, and others, towards the close of the last century, did much to illumine the yet dim horizon of sea-weed history. It was only, however, when the present century was ushered in by the publication of the works of Dillwyn, Turner, &c., that British Algology began to assume the regular form of a science, which the labours of Greville, Carmichael, Mrs. Griffiths, Agardh, and a host of others, have so much expanded and improved. The discoveries and improvements, however, of these great observers still required some master mind to combine, compare, elucidate and popularise them, and that was at length found in the person of our own countryman, Professor Harvey of Dublin, whose magnificent work, the "Phycologia Britannica," has not only woven a never-fading wreath of honour around the author's brow, but, both by the beauty and accuracy of the illustrations and descriptions, forms the greatest contribution to Algological science ever written in any country, or in any language, and cannot fail greatly to popularise the study of sea-weeds both in this and in other countries. It is a great pity that such a work cannot be brought within the reach of "the million;" but that, it is hoped, may yet be accomplished by the new and beautiful process of "Nature Printing," when properly matured, and simplified in its details; when, as it must be unrivalled in the accuracy of delineation, so it may be unequalled in the cheapness of production.

In bestowing our highest meed of praise where it is so justly due, we must not forget those minor labourers in the same field, who, although they have chosen a humbler path, have had a duty to perform, and have done it well. Such works as the unpretending little volumes of Miss Gifford and Dr. Landsborough, are not only calculated to penetrate into many a home into which those valuable but expensive works can never find an entrance, but are well adapted from the simple but

pleasing and elegant language in which the descriptions are couched, to engage the attention and improve the mind.

It may be supposed that after so much had been done, there now remains no more to do; that there are no new species to discover, and no new facts to collect. Such, however, is not the case; much is still to be done. There are even new species still to discover, and there is not a single species, perhaps, whose history has been thoroughly investigated, and respecting which there are not numerous unknown and interesting facts still to trace out and make known. Take any of our common species, for example, *Alaria esculenta*, which is not only very generally distributed, but everywhere abundant; yet no one has hitherto informed us whether it be annual, biennial, or perennial; or the genus *Desmarestia*, of which the fruit is still unknown; or the genus *Conferva*, of which only four or five species are clearly understood, all the others being doubtful. If we know so little about species in-shore, and accessible to sight and touch twice every twenty-four hours, need we wonder that little is known of those species that have their home in deeper waters, and which can only be reached by the iron grasp of the dredge, or when their battered and often mutilated forms are strewed along the shore by the tempest. Let no one fear, then, that the mine is exhausted, or the field limited; there is ample room for all; and when all have done what they can, the glorious volume of Nature will still be but imperfectly explored.

SKETCH

OF

THE GEOGRAPHICAL DISTRIBUTION

OF

BRITISH SEA-WEEDS.

Since the days of Ellis considerable attention has been attracted to Sea-weeds as objects of curiosity, either to adorn the drawing-room or figure in the album; but it is only of late years that their beautiful form and remarkable structure have become subjects of strict investigation or scientific study. Since the publication, however, of the inimitable volumes of Professor Harvey, in which the species are so faithfully pourtrayed, and their structure so fully and accurately delineated that there is generally no difficulty in distinguishing even the most puzzling forms, the lovers of Nature have begun to see that marine vegetation affords a wide and interesting field for the amusement and instruction of the intelligent mind. The admirable little volumes of Miss Gifford and Dr. Landsborough have done much to forward the same object, and in consequence numerous, not mere collectors, but careful investigators, have sprung up on different parts of the coast. Still, however, the result of these investigations is far too limited to afford us anything like an accurate idea of the marine Flora of the British isles, much less to enable us to compare it with that of any other country. In many instances attention only is directed to those species that are conspicuous either in form or colour, whilst only a few are possessed either of the means, the leisure, or the perseverance to carry their investigations into that region of minute forms which often require long and patient research, and high powers of a good microscope, to develope their characters, although these in most instances constitute the most interesting part of the study.

In this corner of the field, therefore, much still remains to be done; many new species to be added, and numerous corrections to be made in the relative numbers and characters of those already but imperfectly known; and here, no doubt, a patient investigator would find his toil

amply rewarded, not only by the addition of many new species to our lists, but, which is of much greater importance, by the clear elucidation of the history of species whose habits and characters are still involved in much uncertainty and obscurity.

In taking a glance at the habitats given in *Phycologia Britannica*, their uniformity is at once striking and confirmatory of the above remarks. Where a general list of localities is considered necessary to accompany any of the less common species, the following, with a few occasional exceptions, constitute the list: Orkney, the Rev. J. H. Pollexfen, Lieut. Thomas, and Dr. M. Bain; Sidmouth and Torbay, Mrs. Griffiths; Falmouth, Miss Warren; Jersey, Miss White and Miss Turner; Appin, Capt. Carmichael; Kilkee, W. H. H.; Roundstone Bay, Mr. M'Calla, &c., &c. Nor are the habitats given as tending to illustrate the general distribution of species round the coast, being, with one or two exceptions, all confined to the south-western shores of the country; Nor is this the result of indifferent or partial selection; they are evidently selected with the author's usual care and discrimination from the extremely scanty materials with which he was furnished. Scarcely a single locality is noted on the east coast either of Scotland or England, and even on the west coast of Scotland the habitats indicated are almost solely confined to Appin, Ardrossan, and the Isle of Arran. It may be asserted that these give a very good summary of the Algæ found on our shores, and this may be quite true as far as regards the mere sum total of the species, but this constitutes the least interesting, and least valuable portion of their history. The mere fact of a species occurring on the British shore is only one fact, and that the least important, in its history, and is of no great value if we remain all the while ignorant of the laws that regulate its distribution. We should always remember that it is just as important to know where a species is not found as it is to know where it is — to know its frequency as well as the extent of its geographical range, its occurrence or non-occurrence, its relative frequency or scarcity in any particular quarter or country; and the laws which regulate these are of the highest importance in connection with the history of the species.

For this purpose it will at once readily appear how important it is that a clear and distinct idea of the identity of species be first attained before recorded facts illustrative of their distribution can be relied on with confidence. Here, however, it may be necessary to remark that it does not seem to be of so much importance to the physical geographer to be able to say what is, or what is not a species, as to be able clearly and indubitably to define, designate, and characterise, any distinctly recognisable form, and thus to render himself intelligibly understood when attempting to illustrate its distribution in any particular district

or country of which he is writing. He may thus not be able to satisfy either himself or any one else as to what is or what is not a species, as on this point "Doctors widely differ," not only from each other but from themselves, and yet he may be able either to collect or communicate a vast deal of valuable information on the subject of Geographical Botany, a subject the very opposite of Antiquarian, and one with which, as far as Sea-weeds are concerned, we are almost totally in the dark.

With these prefatory remarks, and such materials as we have before us, let us see what we can do to illustrate the geographical distribution of marine vegetation on the British shores.

Soil and climate are understood to be the principal causes that influence the distribution of land plants over the surface of the earth. It is generally believed, however, that the first of these has but little influence on the distribution of marine vegetation, as sea plants are not supposed to derive much of their nourishment from the substances on which they grow, which only serve, in most cases, as a means of attachment or support. Hence the greater part of the species have but little partiality to any particular species of rock on which to fix their resting-place, but will attach themselves to any species of rock, stone, or even wood, with apparently the greatest indifference as to whether it be primitive or secondary in its origin, crystalline or otherwise in its structure; nay, so unfastidious are many of them in their choice of a support, that they will twist their snake-like roots, or spread their shield-like bases with equal indifference on the naked rock or round the limbs of some unfortunate neighbour, not objecting even to their own species; for we have often seen a specimen of *Laminaria digitata* so completely enveloped by a forest of young *Laminariæ*, that the poor old parent was well nigh suffocated by its own progeny.

Such, however, is not always the case, as there are some species invariably found on rocks; so are others as constantly found parasitical; some again, especially the minuter kinds, are generally found attached to some particular species, and to that only.

Temperature, however, together with shelter, seems to have the greatest influence in the distribution of sea-weeds, and this of course is greatly modified by the peculiar nature of the medium in which they grow.

Among land plants, although many kinds are furnished with peculiar means of distributing the species, yet in most cases the circles of their distribution must be slowly extended from the original centres; but with sea-weeds it is quite different. The fluidity of the medium in which they grow serves rather to distribute than limit the species, and hence the spores of the Algæ must be often carried to places far beyond the temperature suitable for their healthy vegetation. Hence, we find

that those species which have a limited range become more straggling and less luxuriant as they recede from their centre, and at last gradually disappear, at first disappearing in those spots which are least favourable to their development.

In consequence of this distributing power of the waters of the ocean, we will, perhaps, ultimately find, when our knowledge of the geographical distribution of sea-weeds is sufficiently accurate to enable us to arrive at a just conclusion, that sea-weeds are much more generally diffused than land plants, and that they will be found growing wherever the temperature and other local causes are at all suitable for their growth.

Yet, although the reverse might be more credible, there are few species which are, or at least known to be, really *cosmopolitan* in their habits, and not even a great number whose range of distribution is not limited by the ocean in which they are found. Yet it may be reasonably concluded that, with our increasing knowledge of species and their distribution, our ideas on this subject will be greatly modified, and the range of many species will be vastly extended.

While drawing conclusions on this subject, we must also bear in mind that collectors are generally more intent in their search after rarities and novelties rather than facts illustrative of habitat or distribution, as these are things which to a mere collector are of no value.

The most unobservant eye will observe, on approaching the sea-shore, that vegetation commences about high-water mark, where it is generally somewhat stunted and scattered,—that it presents greater and greater abundance and luxuriance as we approach low-water mark, where it also exhibits much greater variety; thus, in some measure, although to a much less extent, corresponding to the zones of altitude in which it is found in the vegetation of mountain sides. It is not at all times, however, that these zones are clearly discernible; many interruptions occurring from intervening crags, pools, and openings. Where the shore however is gradually shelving, they can readily be traced, and have received names from the predominant species. Thus the highest or outward zone is termed the *Fucal* or *Littoral* zone, from the fact of its being chiefly occupied by the Fuci, the largest and most characteristic species of the olive-brown sea-weeds. This space comprises that generally laid bare by the tide, and contains species whose structure is such as to accommodate them to live for a considerable portion of each tide uncovered by the sea, and wholly exposed to the influence of the atmosphere. When the shore is regularly shelving, or not interrupted by pools and hollows, the Melanosperm or olive-brown sea-weeds will be almost exclusively found to inhabit this zone; but so seldom is this the case, that these not unfrequently form the less characteristic portion, and Rhodosperm or red, and Chlorosperm or green sea-weeds,

are the most abundant: the green in those shallow pools which are close in-shore, and the red in those deep, often rugged pools, where they are not only covered at all times with a considerable depth of water, but are shaded by the over-hanging cliffs, and a beautiful fringe of the larger Algæ, from the light and heat of the noonday sun, as well as sheltered from the fury of the waves. These pools, too, and the channels with which some kinds of rocks are seamed and scored in every direction, are often fringed and festooned with the different species of *Laminariæ*, plants truly characteristic of the second or Laminarian zone.

The first plants that attract our attention in the littoral zone, are of small size, and seem to consider it quite sufficient if they receive a slight watering once a day with the spray from the beating surf, or now and then perhaps at "spring" tides get a more unequivocal bathe for an hour or so at high water—*Rivularia atra*, *Fucus canaliculatus*, *Catenella opuntia*, and in pools may be observed in addition, *Enteromorpha compressa*, *Laminaria fascia*, *Punctaria plantaginea* and *tenuissima*, *Cladophora arcta*, *albida*, and various others; and as we proceed seawards, we successively meet with other species—such as *Halidrys siliquosa*, *Himanthalia lorea*, *Ectocarpus littoralis*, *siliculosus*, and *sphærophorus*, *Sphacelaria cirrhosa*, *Cladophora lanosa*, *Polyides rotundus*, *Furcellaria fastigiata*, *Gelidium corneum*, *Fucus nodosus* and *serratus*, and many other species.

Entering the Laminarian zone, the most conspicuous species are—*Laminaria digitata* and *saccharina*, *Desmarestia aculeata*, *viridis* and *ligulata*, *Alaria esculenta*, *Delesseria alata* and *sanguinea*, *Iridæa edulis*, and a host of other species of every kind and colour.

It must be acknowledged, however, that these zones are only imaginary, and at best but ill defined in nature, having many species that form connecting links, and that the limits of these vary greatly according to situation and other causes, unquestionably the most important of which is, the longer or shorter period of submersion caused by the ever varying phases of the tides.

Chondrus crispus and *mamillosus*, *Rhodymenia palmata*, *Odonthalia dentata*, *Polysiphonia formosa*, *nigrescens*, *Laurencia pinnatifida*, and various other species occupy this border land, extending their range more or less into either side according to situation or the habits of the species.

Odonthalia dentata is only an occasional visitant in the upper, so are the *Delesseriæ* and *Chondri*; *Callithamnion roseum*, *Ceramium rubrum*, *Deslongchampii* and others, are equally abundant in both; but their range is very much influenced by shelter, much more so indeed than by any other cause. Some of them, indeed, will very rarely be found except in the most sheltered spots, where they can be protected, not only from the violence of the angry surge, but from the direct action of the noon-day sun.

Leaving the Laminarian zone, we enter a world of new life and new

forms, where the vegetable kingdom has few representatives, and where the predominating species form, as it were, a connecting link between the animal and the vegetable kingdom. This is denominated the Coralline zone, perhaps inappropriately, as the predominating species are not Corallinæ, but the various species of Zoophytes; usually, at least, under their more ramulose forms, known by the name of Corallines, and which, although now clearly identified with the animal kingdom, bear in the external forms of many of the species, at least a much stronger resemblance to vegetables.

In this zone, as in the last, the marches are by no means well defined, many species, even of Zoophytes, and a few sponges, extending their range into the Laminarian zone; and at low water at spring tides, the rocks are often found carpeted and draped by thousands of the beautiful forms of *Actiniæ*, *Sertulariæ*, *Tubulariæ*, *Crisiæ*, and others, while fragments of rocks are not unfrequently torn from their moorings in shallow water, and thrown into deeper water, where they may grow for a time, and being brought up by the dredges, may be taken as evidence of their being denizens of depths where their existence could only be accidental and temporary.

We have already noticed that many species depend as much on shelter as depth for their favourable development; hence we will always find on a broken rugged shore, where tide-pools are numerous, in large sheltered bays protected from the sweeping lash of a stormy sea, the species are much more numerous, and of kinds more beautiful and delicate, than where the shore presents little variety, and is open and exposed; hence latitude is by no means a true indication either of the number or variety of the species to be obtained in any specific locality.

Warmer currents from more southern seas have a still greater influence on marine vegetation; and hence we find that the western coasts of the British Isles, which are more or less exposed to the influence of the Gulf Stream, possess many rare and interesting species not found on the eastern shores, and some of them even grow and fructify there as luxuriantly as in more southern climes. Some of these, no doubt, owe their existence there to their southern latitude, as well as to the influence of the ocean, and, hence, gradually disappear as we proceed northwards; but as some of them even extend their range to the Orkney Islands, without finding their way to the eastern shores, their presence, we presume, is likely to be due more to the influence of the ocean, and its temperature, than to mere difference of latitude.

At all events, under these combined influences many interesting species occur in the south of England, including the Channel Islands, which there find their northern limit. Among these are conspicuous, *Cystoseira fæniculacea*, *Haliseris polypodioides*, *Padina pavonia*, *Rytiphlæa pinas-*

troides, *Corallina squamata*, *Stenogramme interrupta*,—several species of *Nitophyllum* and *Gracilaria*, *Grateloupia filicina*, and some others. Other species extend their range along the south and west of England and Ireland, but do not reach the north of Ireland or Scotland—such as *Stilophora rhizodes*, *Striaria attenuata*, *Bostrichia scorpioides*, *Laurencia obtusa* and *tenuissima*, *Delesseria ruscifolia*, and many others. Some extend their range into Scotland, on the southern shores of which they reach their northern limit and soon disappear. Among these we may notice—*Arthrocladia villosa*, *Sporochnus pedunculatus*, *Cutleria multifida*, *Delesseria hypoglossum*, *Rhodymenia bifida*, and several others. On the other hand, several species gradually become less frequent as we proceed southward, reaching their southern limit in the north of England or even in the south of Scotland, while on the southern shore of Britain they rarely or never appear. Among these we may notice—*Fucus Mackaii*, *Rhodymenia cristata*, *Phyllophora Brodiæi*, *Ptilota plumosa*, and a few others.

The above, although only a few, will give a general view of the subject; to enter fully into which, as its interest deserves, would carry us far beyond our limits, and, as we have already observed, with the very imperfect data which are as yet within our reach, would even then be very far from complete.

It is a subject, however, of great interest, and would well repay a laborious investigation, and as materials are daily accumulating, it is possible, as it is to be hoped, that this will not be very long a subject of complaint.

We would now most willingly devote a few pages to a more extended view of the subject, and take a glance at the distribution of our native species on foreign shores; for this, however, we have left but little space, and must pass it over, however interesting, with a few brief notices; and the more so, as our sources of information are meagre in the extreme, and obtained by the examination of points of coast few and far between, and totally inadequate to enable us to form any just or accurate conclusions on the subject.

There are a few species which are as yet only known as natives of the British Isles; yet this does not prove they may not grow on other shores, as these are still so imperfectly known—a small speck here and there, or a few gleanings collected during hasty journeys, being all that is known of the general marine vegetation of the world. From the information gleaned from these, however, we learn, what we have already surmised, that at least many species of Algæ are widely distributed; and although future research may very possibly prove that some of these forms, now considered identical, are really distinct species, yet there is as little reason to doubt that a more extended knowledge of the distribution of species will bring to light a host of others, whose range of

distribution is much less limited than was supposed, and many more of our British species may then be found represented by identical or closely allied forms in other lands.

It may readily be anticipated that those species which are found only on our southern shores, or which become scarce as we proceed northwards, have, in most instances, their centres of distribution in the south of Europe. This is found to be the case, and, consequently, although rare denizens with us, or only now and then picked up as "stray waifs" from a foreign shore, many of them are common along the shores of France, Spain, or the Mediterranean. Others are represented by identical or very closely-allied forms on the western shores of the Atlantic, whence perhaps their spores, or even their primogenitors, may very possibly have been carried by the different branches of the Gulf Stream, and thus become partially distributed on our shores.

Omitting those which have only been picked up floating, or found among the "Ocean weeds, heaped on the surf-beaten shore," and whose rights of citizenship are very questionable, we may notice the following as really indigenous on our shores, but found equally or more abundantly on the shores of southern Europe :—*Cystoseira barbata, fœniculacea*, and *fibrosa, Arthrocladia villosa, Haliseris polypodioides, Padina pavonia, Dictyotomaria, Striaria attenuata, Polysiphonia fibrata, byssoides*, and others. *Dasya coccinea, Bonnemaisonia asparagoides, Nitophyllum punctatum, Stenogramme interrupta, Rhodymenia ciliata*, and many others.

Of those which are common to the eastern and western shores of the North Atlantic, we may note the following :—*Punctaria tenuissima, Delesseria sinuosa* and *alata, Fucus vesiculosus, Odonthalia dentata, Rhodomela subfusca, Polysiphonia urceolata, elongata, Brodiæi* and *fastigiatum*, &c., whilst some of them seem even to have found their way into the North Pacific, as *Chylocladia ovalis, Laurencia obtusa, Desmarestia viridis*, &c. Still more interesting is it to find, even on the shores of the many isles that gem the Southern Ocean, numerous species, if not perfectly identical, at least very nearly allied to our own. From the shores of New Holland and New Zealand, we have *Dasya arbuscula, Laurencia tenuissima, Chrysymenia clavellosa, Asperococcus Turneri, Dictyota dichotoma, Delesseria ruscifolia, Laurencia obtusa* and *pinnatifida, Rytiphlæa pinastroides*, and numerous others ; while every day adds to the list, by extending our knowledge of the productions of places hitherto unknown, or but very imperfectly explored. A few species seem almost cosmopolitan in their habitat, being found in greater or less abundance on all the northern shores both of the Atlantic and Pacific, and some of them appear to be no less plentiful and widely distributed on those of the Southern Ocean.

SKETCH

OF THE

STRUCTURE OF SEA-WEEDS.

We have generally detailed the structure of each species at considerable length, in connection with the descriptions, but it seems still desirable to give here a somewhat condensed and general view of their structure in such a way as to be intelligible to the general reader. For this purpose we shall adopt a rather new and very simple mode of arrangement, and, beginning with the most simple, gradually ascend to those forms whose structure is the most complicated and intricate.

We need not remind our readers that sea-weeds belong to the great tribe of *Cellulares*, or cellular plants; but it may not be so generally known that the forms and arrangements of these cells are as various and curious as are those of the species themselves—every species differing, often by a long interval, from its neighbours, although frequently scarcely distinguishable in external form.

The forms of the cells themselves present great variety; some are spherical, others oval, cylindrical, oblong, quadrate, clavate, and innumerable other modifications of these are everywhere observed; whilst some are simple, and others are variously branched with various degrees and forms of ramification. Examples of many of these forms are often found in the same species, three or even four series of cells being employed in the construction of a single stem, and even in the same series the cells often change as they recede from the axis, where the cells not unfrequently form longitudinal filiform series, while the rest are arranged in vertical radiating series, thus giving occasion to a vast variety in the mode of arranging the cells as well as in the forms themselves. The simple spherical cell is beautifully illustrated in that curious little plant the red-snow, *Protococcus nivalis*, which consists only of a single cell, and is very common in the form of moniliform strings constituting the periphery of those stems which have the most complicated structure, particularly in those that are cylindrical, the quadrate or polygonal cell being most common in flat or compressed fronds.

There is, perhaps, no reason for this great diversity in the forms of cells; we do not see why a spherical cell could not have been employed in the construction of every form or species, excepting in those cases where a combination of longitudinal filaments appears necessary to afford strength and elasticity to the frond. It might be supposed that quadrate cells were best suited for the formation of flat or membranous fronds, but such does not seem to be the case, as they seldom occur in such situations. The flat polished surfaces of the *Rhodymeniæ*, as well as the smooth and equally polished surfaces of cylindrical fronds, such as *Mesogloia*, *Gracilaria*, &c., are all produced upon the spherical terminal cells of moniliform filaments, the interstices being filled, perhaps, with starch granules.

We have already observed that the most simple form of life among the Algæ, perhaps in the vegetable kingdom, was exemplified in that singular little plant the red-snow, *Protococcus nivalis*, and that it consisted only of a single cell; this, however, is not the only instance of a plant composed of a single cell. Many of the *Oscillatoriæ* consist of a single cylindrical cell, very much elongated, and filled with granular endochrome, which becomes divided into distinct portions or sporules when the plant has reached maturity. In *Vaucheria* this cell is not only greatly elongated, but repeatedly branched, the single tube or cell continuing uninterrupted throughout all the ramifications of the individual plant. It is in the genus *Codium*, however, in which the most signal adaptation of the simple cell is observed; there we find a plant forming a round spherical ball, or an elongated cylindrical multipartite frond, not built up, as might be expected, of a series of longitudinal jointed filaments, or of an irregular congeries of polygonal cells, but whose axis is composed of a single cell, much branched throughout, so as to form a fascicle or bundle of inarticulated tubes or rather divisions of the same tube, from the outer of which arise innumerable club-shaped branches, spread in a vertical manner, and of equal length, so as to form the periphery of the frond, thus forming one continuous much-branched cell, through every ramification of which the internal fluid appears to have free and uninterrupted access.

In the *Nostochineæ* we find a somewhat more complicated structure, consisting of a single series of bead-like cells, so arranged as to form a simple moniliform filament, these filaments being either uniform or divided into distinct series by intervening cells of a different form from the others. In the true *Confervæ* the arrangement of the cells is on a similar plan, but here they are mostly cylindrical, often much elongated, and forming a simple or much-branched frond, as in the *Cladophora*, the branches arising from the apices of the cells.

A peculiar arrangement of these simple or branching filaments is

sometimes adopted, either to form a tubercular base, as in *Elachista*, or to produce an entire crustaceous frond, as in *Cruoria*, *Hildenbrandtia*, and others.

In the *Ceramieæ*, among the Rhodosperms, the structure is scarcely different from that of *Conferva* and *Cladophora*, but here we occasionally find, as in *Ptilota* and *Spiridia*, and even in some species of *Ceramium*, an approximation to a higher state of development, in the simple articulated filament being wholly or partially covered by a distinct coating of cellular tissue, which is either confined to the dissepiments, as in *Ceramium*, whence it spreads sometimes over the whole articulation, or, as in *Ptilota*, commences at the root, and gradually extends upwards until the whole of the frond is covered by the tissue, the original string of cells forming an articulated filamentous axis running through the centre of the frond.

In some species the entire plant may be considered as composed of this articulated axis, many times doubled, so as to form a rope-like bundle of parallel filaments, the cells of which are all of equal length, giving the frond an articulated appearance, as in the *Polysiphoniæ*, this axis being either naked throughout, as in *P. urceolata* and its allies, or partially covered with a cellular tissue, as in *P. elongata* and others, thus forming a connecting link with *Rytiphlæa* and *Chondria*, where the fronds are wholly covered with cellular tissue. In *Bostrychia* and *Rhodomela*, the articulated structure of the frond disappears as the cells gradually diminish in length towards the circumference, and their dissepiments not being opposite are not externally apparent.

Many of the flat-fronded species are exceedingly simple in their structure, being composed of nothing more than two thin membranes, consisting each of a single stratum of cells, either quadrate, as in *Punctaria*, or polygonal, as in *Laminaria*. In some the two membranes are closely applied, while in others, as in some species of *Asperococcus*, the membranes are separated by a net-work of large cellules, and in others, as in *Cutleria* and *Halymenia*, &c., it consists of little more than a few simple or slightly branched fibres uniting the two membranes.

The structure of compressed and cylindrical stems is exceedingly various, and presents some of the most singular and interesting combinations of cellular structure that could be conceived, which afford most beautiful objects for microscopic investigation. In most of the *Fucaceæ* the cells are all uniform, differing only in size; the large central cells gradually diminish in diameter towards the surface, where they are generally very minute. Such is their arrangement in most of the *Fucaceæ*. In other species this arrangement is partially or wholly inverted, as in *Hypnea*, &c., which have the cells densely compacted in the centre, while the remainder are of larger size, and generally become smaller to the surface.

In many species, however, the structure is much more complicated, and consists of several strata, the axis consisting of slender articulated filaments, arranged longitudinally, densely compacted, branched and anastomosing, the remainder becoming gradually vertical, and forming simple or dichotomous radiating filaments.

The most beautiful examples of this arrangement of the cells is to be found among the *Gloiocladiæ*, in the Rhodosperms, and among the *Chordarieæ* in the Melanosperms. None of the Chlorosperms ever attain so complicated a structure.

In many of the Rhodosperms the irregular cellular structure is often combined with moniliform arrangement; the cellular structure occupying the central portion, the moniliform filaments constituting the periphery; this arrangement is rare among the Melanosperms, and still more so among the Chlorosperms; the most complicated structure being found in *Bryopsis* and *Codium*, to which we have already alluded.

Before leaving this part of the subject, we cannot help glancing, however briefly, at the fructification of the Algæ, which forms one of the most curious and interesting parts of their history. It is a subject, however, as yet but imperfectly understood, and much observation is wanted before we arrive at anything approaching to a satisfactory knowledge of the subject. Among the Chlorosperms in particular, much observation is still needed, as the only representation of fruit among them yet observed consists in a sporoid mass, composed of the more than usually condensed endochrome, of the nature and destination of which we know but little beyond conjecture, while in many of the species, even this simple kind of fructification has not been observed.

In these plants the cells are filled with colouring matter, at first in a more or less fluid state; at length, as the plant advances towards maturity, this becomes more condensed in substance and in colour, and generally more distinctly granular, and at length bursting the walls of its cell the little globule escapes; never, however, that we have observed, in a solid form, but in the form of a more or less densely granular fluid, which immediately assumes the spherical form again as soon as it has escaped, or rather as it escapes: whether these granules, however, are really spores or zoospores, or both or neither, seems as yet undetermined; one curious circumstance has been observed, namely, that most of them possess a proper ciliary motion at some period or other, similar to what has been observed in the zoospores of the *Fucaceæ*.

In the Fuci, the antheridia which contain these zoospores, are evidently connected with the fructification, but in the *Rhodospermeæ*, where they are equally common, this connection is not so easily traced, as they generally terminate the ultimate divisions of the frond, while the fruit is in most cases lateral. In *Polysiphonia* they are often so abundant as

to give a distinct and very conspicuous tint to the plants on which they are produced.

Among the *Melanospermeæ*, the fructification is of one kind only, and consists of spores or sporoid masses of granular endochrome. These are either contained in conceptacles hollowed out in the substance of the frond and lined with articulated filaments, which are at length converted into spores, as in Fucus, or form naked spherical or ovoid bodies on its surface, as in most species of *Ectocarpus*, whilst in *Laminaria*, and some others, they are found imbedded in a stratum of vertical filaments covering the surface of the frond. In the greater part of the *Dictyoteæ* they are generally collected in little bundles or *sori* on the surface of the frond; and in the *Chordarieæ* they are formed by the metamorphosis of the radiating filaments which form the periphery of the frond.

There are several less important modifications of fruit or of its mode of arrangement, but they are of less common occurrence, and will be found described in connection with the species on which it occurs, while on several species nothing analogous to fructification has yet been observed.

Among the Rhodosperms the fructification is much less ambiguous, although in many of the species it is still but very imperfectly understood, and with the fructification of some we are still unacquainted.

In many species two kinds of fruit have been observed. One kind consists of spores, which are contained, as in *Polysiphonia*, in external capsules furnished with a terminal spore, or, as in *Gracilaria*, *Rhodymenia*, &c., are found imbedded among sporiferous filaments (*paraphyses*), by the metamorphosis of which they are produced, and which form tufts radiating from a central placenta, within hollow tubercles scattered over the surface of the frond or imbedded in its substance. In some, as in *Ceramium* and *Callithamnion*, the spores are imbedded in soft pulpy berries, which are either simple or variously lobed and clustered on the sides of the branches, at one time exposed, and at another closely surrounded by an involucre; in some species, as in *Ginnainia* and *Halymenia*, these masses of spores are found attached, not to the outer surface but to the inner, the frond consisting of a thin membrane rolled round in the form of a tube, and then strengthened by a few radiating filaments.

The other mode of fructification, so frequent in the Rhodosperms, has been termed "Tetraspores," from the circumstance of its breaking up at maturity frequently into *four sporules*, oftener into three, and occasionally into six. The arrangement of these tetraspores is very various; in *Polysiphonia*, for example, and allied species, they are produced singly in the articulations of the ultimate ramuli: in *Ceramium* they are whorled, either round the dissepiments or the articulations, and in

Callithamnion they are found externally on the ramuli, and are sometimes sessile, at other times stalked, being produced by the suppression of a ramulus. In the flat-fronded species that are not furnished with a midrib, they are generally immersed among the filaments of the periphery, and are either scattered over the whole surface of the frond, or are collected in groups or sori along its margin, while in those species that are furnished with a midrib they are either imbedded near its extremity or form linear sori along its margin. Abundant examples of both these kinds will be found in *Rhodymenia*, *Nitophyllum*, and *Delesseria*. In a few, as in *Plocamium*, the tetraspores occupy proper leaf-like processes arranged along the margin of the frond, and in *Polyides*, *Gymnogongrus*, and others, the *spore-threads* form warts, scattered over the surface of the fronds, and these or their articulations are at maturity resolved into spores, at other times, as in *Dudresnaia*, they form beautiful whorls round the articulations, or, as in *Gloiosiphonia*, *Helminthora*, &c., constitute a coating of vertical filaments surrounding the whole frond.

THE

USES OF SEA-WEEDS.

THE uses to which sea plants have hitherto been applied are not numerous, and the species employed are equally limited in number. We have already found that in ancient times they were used, but only in times of scarcity, to mix with other vegetables as food for cattle; and in more modern times, and under like circumstances, we find them used for a similar purpose. During the last spring (1860), when food had become scarce, the sea-shore was resorted to, in order to complement the supply.

We are not aware, however, that any means were ever employed either to render them more palatable or more nutritive; in most cases, we believe, the cattle were left to select them for themselves; and we were told by a young man who was "herding the stirks" on the Sutherland shore, the *Laminaria saccharina*,—the one they were eating at the time,—was the species they generally preferred. There can be no doubt, however, but that many other species are equally nutritive, and that they could be very easily rendered more so as well as more palatable by a little preparation, such as solution in water or mixing up with other substances.

CHINA is perhaps the only country where sea-weeds have ever been used as an article of human food, unless in times of great scarcity. In this country they may have been so in the days of barbarism, when, from the improvidence of the people periodical seasons of famine would be of common occurrence. In this country at the present day we have only seen them used as a relish or as an amusement. People that live near the coast not unfrequently make a party for the Dulse rocks once a year, for the sake of collecting "dulse and buckies," but more for the sake of amusement than for either, although they generally carry a load of both home with them; and there are in most of the maritime towns persons who regularly hawk them through both town and country for sale. The buckies are always boiled, but the "dulse and tangles" are always eaten raw; and, so far as our knowledge goes, no sea-weed is used in

Scotland, either as a pickle or preserve, nor undergoes any process of cooking, except that of rolling a hot poker over them for the purpose of partially roasting them, unless this may be called such. *Rhodymenia palmata*, *Laurencia pinnatifida*, and the stems of *Laminaria digitata* (old or young), are the only species we have ever seen so used; but *Iridæa edulis* and *Porphyra laciniata* are said to be used as pickles in various parts of England. Irish moss is sold in our shops as elsewhere, and consists of *Chondrus crispus* and *mamillosus*, but is very little known except among the wealthy; the poorer classes are ignorant of its existence, and of course do not use it; even the wealthy, I believe, in most cases only use it when prescribed by "the doctor," and know little of its nature, and less of its origin.

The swallows' nests of China are now too well known to require more than a passing notice here; they are generally understood to be composed of a starchy substance, procured from some species of *Gracilaria*, but it is quite possible that more than one species may enter into their composition.

We can see no reason why many species of sea-weed should not contribute to the luxuries of our tables, and furnish even the poor with a wholesome and nourishing dish; many of them are composed almost wholly of starch, the principal material for which we are indebted to other vegetables, and why should we not receive them through the medium of plants which grow in the sea as well as on the land? It is astonishing how far habit will influence us in food as well as in other matters. The most exorbitant prices are often given for the swallow's nest of China, yet we are not told that the same people put any value on the sea-weeds whence they have been procured, although scarcely anything, dead or alive, is said to be able to escape the voracious appetites of that extraordinary people.

We are told by Professor Harvey, in "Phycologia Britannica," that in Japan a species of sea-weed is bleached and dried for the purpose of using as food, and that it is sometimes brought into this country, but we know as little of its preparation or use as we do of the wonderful people who prepare and use it.

We have already noticed the medicinal application of Iodine, a substance of a beautiful purple colour, prepared from the ashes of sea-weeds; this is the only substance known to possess medical properties obtained from the Algæ, but sea-weeds are said to be used medicinally by the inhabitants of various countries. On the coast of South America a species is chewed by the inhabitants for scrofulous swellings of the glands, and great benefit is said to be obtained, and it is more than likely that the iodine contained in the sea-weed is the source of the cure. In Ceylon, and several other islands in the Indian Ocean, sea-weed is

employed medicinally, and it is curious that in all cases it is for a similar purpose.

Very probably sea-weeds possess other, and perhaps even more valuable medicinal substances besides iodine, but valuable discoveries are often the result rather of accident than of patient research, and are sometimes stumbled upon by the naked and ignorant savage as well as by the votary of science; and it is more than likely that the properties of iodine were known and employed long before the substance itself had been seen.

To the farmer, however, the most important application of sea-weeds is undoubtedly as manure. For this purpose they are extensively employed on all the sea coasts where they abound. Much discrepancy exists, however, as to their real value, and by many it is said that the sea-weed itself is of much less value to the crop than the swarms of insects to which it forms a ready nidus, and whose excrements and exuviæ form the most important part of the product after the decay of the Algæ. They are still largely used, however, and are considered by the farmers a great boon, although they are so perhaps chiefly in so far as they afford return without any outlay except the expense of collecting. They are mostly employed in Scotland for the turnips and potatoes, although it is generally allowed that the potatoes are of a very inferior quality, being soft and waxy; and if so, it seems more than probable that the turnips are equally defective, although their defect is not so readily apparent. Where the shore is low and shelving, they are generally carted off at low water, but in many places this would be impossible, and the poor people who have their fields on the Highlands above, are subjected to the laborious operation of carrying them in baskets on their backs, up winding paths cut in the cliffs from two to three hundred feet in height. In some places ponies are employed, but in many places the paths are too steep even for these.

The sea-weed is generally laid on the land at once, but in some cases it is mixed up with other manure, and allowed to ripen and become mellow in the heap.

At one time sea-weeds were extensively employed for the manufacture of kelp for the use of the soap-boiler and glass-maker. At present it is but little used, except for the production of iodine, a substance now becoming extensively used in medicine. Before the beginning of the present century the price of kelp was only from 3*l.* to 4*l.* per ton, but such was the demand a few years afterwards that it rose to upwards of 20*l.*, and even at that high price could not be procured in sufficient quantity to meet the demand. In order to increase the production, the proprietors in our northern islands found it worth their while to make plantations of sea-weed; and for this purpose, instead of clearing the ground of stones, they covered the sandy shores with them, as the Algæ will

not grow without rocks or stones on which to fix their roots. The introduction of barilla, however, produced a reaction, and the price soon fell even below the former standard. Since that time it is said rather to have increased, but at present the most valuable substance procured from it is iodine, the other substances being of too litttle value to be worth extracting alone. Iodine is useful in medicine in various ways, and attempts have been made to employ it in the arts, but no *mordant* has been yet found to render it sufficiently *fast* for the purposes of the dyer; it was also employed in the production of Calotype pictures, and it is not impossible but that it may yet be found applicable for many purposes in which it has not as yet been employed.

For fuel, sea-weeds are but ill adapted, yet in some parts of the country necessity has induced the people to employ them for that purpose, although the small quantity of carbonaceous matter they contain, as well as the large quantity of salts, must render them but slow firing. But, in these days of utilitarianism, however, we must not forget that in the great kingdom of nature there may be other purposes for which many things are intended to serve than that of bringing in just so many pounds, shillings, and pence into the ever-greedy pockets of mankind.

There are thousands of sea-weeds too small or too rare ever to be applied, perhaps, to any useful purpose by man, yet we cannot for a moment suppose that these have been created in vain. No doubt they serve a great and important purpose in the great laboratory of the ocean, and add to the beauty and variety of marine vegetation, or serve to spread a rich and bountiful table in Ocean's wilderness for her numerous inhabitants. The animals that exist in the ocean are innumerable, and their existence almost entirely depends on the submarine forests and pastures that line the shores. Were these removed, the multitudes of molluscs, crustaceans, and other animals that find food and shelter under their shadow would soon disappear, and the larger animals that feed on them would soon follow, and even man himself would then lose a very important portion of his daily supplies of food, and thousands would be deprived of a valuable source of employment and of their wealth.

We thus see how mutually dependent on one another is every link in the beautiful chain of creation, and how perilous would be the existence of the whole if even one were removed without its place being adequately supplied. We are thus also led to consider one of the most important uses of a study of Nature in general, and of sea-weeds in particular. Their beautiful forms, their vast variety, and their importance in the great scheme of creation, at once point to the wisdom and goodness of the Creator, as manifested in the abundant provision which He has made for the existence and happiness of his creatures.

Sea-weeds will thus be found to afford a most valuable and unlimited source of interest and exercise for the mind; and although no one who has not seen them luxuriating in their native rock-pool could form any idea of their *living* beauty, yet even in their dried state they possess a peculiar charm, so easy and perfect is their preservation, that the greater part of them can be examined in that state almost as well as when alive, while their examination by the microscope will supply an almost exhaustless source of interest and instruction to the intelligent mind; and is it possible that any one could contemplate the ever-open pages of this beautiful volume of Nature without having his feelings of gratitude enlivened, his devotion deepened, towards the Allwise Creator, who has so admirably arranged, and whose benevolence sustains so vast and so delicate a chain of being?

INSTRUCTIONS

FOR

COLLECTING, PRESERVING, AND ARRANGING ALGÆ FOR THE HERBARIUM.

Collecting.

Provide yourself with a tin vasculum, an oil-skin bag, and some small bottles with corks. The stronger and rough species may be put into the former, the more delicate into the second, and some of the finer, whose colour soon fades on exposure to the air, may be put into the latter filled with sea-water.

The Algæ are to be found amongst rejectamenta cast out by the sea at low water, growing on the larger Algæ, and on the rocks and stones; by proceeding out as far as the tide will allow there is the greater likelihood of meeting with rarities. At very low tides species are to be met with that cannot possibly be found at any other time than by dredging; keep also a good look out when the tide begins to flow, as often good and rare species are to be found floating on the surface of the water. Again, after a heavy storm landwards, a careful examination of the rejectamenta, to be often found very abundant, will generally richly repay some hours' diligent research—let this be done as soon as possible, as Algæ collected into bundles and quantities very soon decay, and prove of little value as herbarium specimens, as they are sure to lose their colour at least, and then to lose much of their beauty. Rock-pools may also be visited, many species being as it were peculiar to such places—the shady side will generally yield the richest harvest as well as the most delicate species. Having thus visited, and we will suppose, collected from each and all of the sources above mentioned, we will return home with our treasures. We must then provide ourselves with a basin of fresh water in which to cleanse the weeds from sand, &c., not putting too many in at one time, nor mixing the coarse and finer species.

Having thus properly cleaned your specimen, it may then be transferred to another vessel—a shallow one (say three inches deep, and white) is best; some use luke-warm water, but we prefer cold, as being less likely to injure the very delicate colours of some species, and the easily injured colours of all the *Rhodospermeæ*.

Mounting on Paper.

The paper on which the weeds are to be floated should be stout (drawing-paper, indeed), cut neatly of an oblong shape into uniform different sizes. We find four to include nicely all the British species, saving a few of the larger and coarser, when paper must be provided specially for them.

Series 1.—3 inches × 2.
2.—4 inches × 2½.
3.—5 inches × 3.
4.—7 inches × 4½.

Your plant being in the shallow vessel, place a piece of paper suited to its size underneath it, gently moving both to near the surface of the water, at the same time using your eyes and hands to good purpose, by making the plant assume on the paper a natural and of course graceful form. A pair of scissors ought to be at hand to remove any superabundance, and a rather stiff camel-hair pencil may be used to arrange the branches of the plant.

Some caution must be exercised in removing the paper with the plant from the water, as otherwise it will collapse and cause all your "love's labour" to be lost, practice alone will enable one soon to overcome this difficulty. The specimens being moved from the water, they should be laid for a time on blotting-paper placed on a sloping board to allow the water to run off.

Before the paper on which are the specimens is quite dry, place the specimens on several folds of blotting-paper, 4to size, covering them with a single fold of muslin or fine linen, then again a layer of blotting-paper, repeating the same till all your specimens are in what we will call the press or under pressure. It will be understood that here, as before, the coarse and fine species should be kept apart, and that the coarse species will require more blotting-paper between each layer than the finer.

Their Management in the Press while Drying.

Some use a screw-press, which is very objectionable; the plants being put into it wet, occupy more space at first than when they are partially dried, the consequence is, if it has been omitted to turn down the press, and at the proper time, the whole of the specimens are without pressure at all; they then curl up and get distorted in such a way as to make it

impossible again to make them what they ought to be. The better and safer way is to have boards of an inch in thickness, between which is placed the layers of blotting-paper and plants; have loose weights placed on the upper board, which will sink as the plants occupy less space, thus keeping them always under equable pressure.

At first the pressure need not be great, for fear of bruising the specimens, as well as marking them by the threads of the linen or muslin. In the course of, say two hours, it is advisable to take all the specimens out of the paper, substituting dry paper in its place; it is as well at this stage of the proceedings, however, not to remove the muslin. The same process is to be again repeated, a layer of blotting-paper and then of sea-weeds, till all are again ready to be placed between the boards, which being done, the weights are once more put on, but heavier than before. Leave them for, say twenty-four hours, when the same proceedings as before are to be adopted. This time the muslin may be removed, so as to prevent its impression being finally left on the specimens. The specimens are to be thus treated daily for eight or ten days, when they will be found in ordinary cases well dried and ready to be put into the herbarium. Before being placed there, their scientific name, habitat, date when collected, with any other observations, should be written at the bottom of each species to the right, or if there is not sufficient room there, on the back of the paper.

Exceptions as to General Rules.

As there are exceptions to all known rules, so is it with the instructions we have just concluded. Some of the larger Fuci are better to be dipped for a few seconds in warm water, which makes them not only more pliable, but brings out a portion of the gelatinous matter contained in them, which may be wiped off with a cloth. Others, again, as the *Porphyræ*, do not adhere well to paper unless the muslin is allowed to remain on them till perfectly dry; this being done they will be found afterwards not only to adhere, but to form as it were a portion of the paper itself. Gelatinous kinds, such as *Mesogloia*, *Gloiosiphonia*, &c., would be entirely destroyed were they to be pressed and treated in the usual manner. Let them be exposed to the air till dry, wet the under side of the paper on which they are to be placed, and then apply firm pressure. Some of the delicate species, again, lose their fine colour when floated in fresh water, they should therefore be done in sea-water; or should this not be procurable, a piece of rock-salt dissolved in water is a good substitute.

Arrangement of Algæ in the Herbarium.

There are three ways in which Algæ may be kept. First, in the popular way, inserted by the four corners into the leaf of an album, and certainly

there is no way, when neatly done, they look so well. They should not however, as is usually the case, be promiscuously done, but arranged according to their natural sequence. When science is thus wedded to beauty it adds greatly to the value of the collection.

The second, is to have sheets of white paper marked alphabetically, into which loosely each species, under its own letter, is to be put. This for reference is very convenient.

The third, is to have one or more wrapper-sheets of white paper devoted to each genus, and to attach the several species each to a slip *or single sheet* of paper, rather smaller than the covering, with gum by the left-hand corner. You can thus obtain at the same time natural arrangement with alphabetic correctness, and freedom of moving them for microscopic inspection, with more security than when loosely put in, as in No. 2 arrangement. It is to be understood a single sheet is to be devoted to each species at least. So that everything may be clear and distinct, it is proper to label the wrapper-sheets boldly thus :

SERIES I.—DESMIOSPERMEÆ
FAM. 2.—Rhodomelaceæ
Genus 1.— ,, *Odonthalia*

and the species are attached to the single sheets as leaves, lying in the wrapper sheets. One wrapper-sheet may contain all the species in that genus ; but if two or more leaves are required, they can be numbered $\frac{1}{1}$, $\frac{2}{1}$, $\frac{3}{1}$, and so on ; and thus with a numbered generic index to the whole, any species may be found in a few seconds.

Algæ, their Preparation for the Microscope.—Accessories requisite.

We will first enumerate the requisites that ought to be within reach of everyone when they proceed to mount objects for the microscope. Not only is our work better done with proper implements, but much time is saved also. Slips of glass, three inches by one ; thin glass for covers, round or square ; forceps, knives, and scissors, Japan varnish, gold size, and thin pieces of gutta-percha for forming cells when the object is to be preserved in a fluid state ; saucers, watch-glasses, hair pencils, needles with handles, and pieces of chamois leather and linen with which to thoroughly clean the glass slips ; a small iron table with four feet, and a spirit lamp to stand beneath ; gutta-percha rings, paper covers, a little paste and gum.

How to mount Algæ as Objects for the Microscope.

Seated at the table with all these requisites around us, we will take, say a small portion of the exquisite "*Callithamnion plumosa.*" All that is required is to put a thin coating of varnish all round the thin glass

cover, the object having been laid on the surface of the glass slide, with the necessary quantity of preserving fluid, the glass cover is then dropped over it. As the varnish repels the fluid, none but superfluous liquid escapes, which may be removed with blotting-paper. Having stood for a couple of hours, the varnish will have become firm enough to allow of its being finished by a neat coating of Japan varnish, repeated two or three times till all looks smooth and neat. Wax varnish looks much livelier, and is preferred by some.

Sections of the stems and other portions of the larger Algæ will require to be mounted in cells, which are made as follows. A square or circular space is marked off with varnish on the centre of a glass slide, the coating to be repeated till found sufficient. This being done, place the slide on a small iron table with a spirit-lamp beneath, till it is heated so as to burn the fingers if touched. A pair of wooden forceps will hold it securely in the left hand, while with the right a gutta-percha ring is dropped above the space formed on the slide by the varnish, and pressed down till it is perfectly flat. When coated, the cell may be more securely and neatly attached to the glass slide by more varnish applied to the exterior edge. This cell is now to be filled with preserving fluid, and the object placed therein afterwards; a thin glass covering is to be put on, and finished off in the same way as in the previous instructions as to *Callithamnion plumula*.

Dry specimens may be mounted by merely putting them on the glass slide, putting a thin glass covering over them, and then finishing by enclosing the whole of the glass slide with a fancy paper cover, leaving a circular or square space where the object is to be seen.

It must be borne in mind that all these operations must be performed neatly and cleanly, no dust allowed to remain in the cells, or in the interior of the glass covers, as otherwise you may one day repeat the old story of the person who, when looking with his telescope at the moon made sure he saw an elephant there, whereas it was but a spider had got in between the glasses of his instrument. Your case will be much worse, for whereas the telescope multiplies by hundreds the microscope does so by thousands.

On your commencing these things there will be an awkwardness and want of neatness; but a short time, with a little perseverance, will in this as in every other case overcome all obstacles.

The undernamed are the different liquid preparations used for preserving Algæ.

Goodby's Solution.—4 oz. bay salt, 2 oz. alum, 4 grains corrosive sublimate, two quarts boiling water.

Mr. Thwaites' creosote preparation.—1 part alcohol, 14 parts water, to be accurately filtered through creosote. This should be filtered

through prepared chalk, and the solution allowed to stand some time before use.

Distilled water.

Glycerine 1 part to 2 of camphor water.

Deane's Gelatine.—1 oz. of gelatine in 4 oz. of water until the gelatine is quite soft, then add 5 oz. of honey previously raised to boiling heat in another vessel, the whole is then to be made boiling hot, and when it has somewhat cooled, but is still perfectly fluid, six drops of creosote and half oz. of spirit of wine, previously mixed together, are to be added, the whole to be filtered through fine flannel. This composition when cold forms a very stiff jelly, but becomes perfectly fluid on the application of a very slight warmth, and may then be used like any other preservative liquid, care being taken, however, that the slide and glass cover are themselves gently warmed before it comes into contact with them.

Arrangement of Algæ in the Cabinet.

Having, then, your slides finished, see, before putting them into the cabinet, that they are thoroughly dry. Write the name of the object with a diamond on the glass, or number each slide, keeping an index of the names, corresponding to their numbers. In the case of the slides being covered with paper, the name or number can be written with ink. Cabinets in which the objects lie flat are preferable, as objects mounted in liquid particularly, keep best so laid.

Quekett's and Dr. Carpenter's works on the microscope may be consulted with advantage; indeed the latter work is almost indispensable to the microscopist.

Instructions for the Cultivation of Algæ.

Now that the aquarium is so fashionable in drawing-room and parlour, we may reject the bottles in which we used to grow very fine specimens with little or no care, thus, filling the bottle with sea-water, dropping therein a specimen attached to a small pebble or portion of an old shell, placing it out of the glare of the sun, there it grew and flourished for months and years, till it completely filled the bottle. As it is only the handsomest species of Algæ that are grown in the aquarium, mostly too *Rhodospermeæ*, we may state as a general rule they are never to be exposed to the sun, and kept in as equable a temperature as possible, rather cool than hot. The need of the former more particularly may readily be recognised when it is borne in mind that some of our finest species and specimens have been dredged from six and seven fathoms of water (42 feet).

All our native *Rhodospermeæ* may, with a little practice, be grown successfully under the above conditions. See that all are got attached to

some object, and if possible in an early stage of their growth. The *Melanospermeæ* and *Chlorospermeæ* are more difficult to grow, many of them requiring daily exposure to the sun and air. Several, however, of both families may be successfully grown in the aquarium ; indeed it may be, with more experience, and of course more extended knowledge, the time may come when we will be able to grow every species of our native Algæ. Here, then, is a wide field of enterprise, requiring much care and caution, and all the pleasanter for the little difficulties in the way. One difficulty surmounted often helps us over many, in small things as well as great ; and in the growing and study of Algæ we have the pleasant and profitable employment of trying to search into a portion of the wonder-working creations of the Almighty.

SYNOPSIS OF THE FAMILIES AND GENERA.

Sub-Order I.—RHODOSPERMEÆ.

Plants with red seeds, and fronds mostly of a red or brownish red colour; in some species crustaceous, in others secreting lime in the cells.

Series I.—DESMIOSPERMEÆ.

Sporiferous-nucleus consisting of tufted spore-threads attached to a cellular placenta. Single spores formed one in each cell of the spore-thread, or only in the terminal cell.

§ I.—Nucleus lodged in an external Conceptacle or Capsule.

* *Placenta basal. Spores pyriform, formed in the terminal cell of the spore-threads.*

Fam. I. **RHODOMELACEÆ.**[1]—Frond mostly articulated, especially when young (cellular in *Odonthalia*, and partially so in others); tetraspores produced in series immersed in the ramuli, or in distinct pod-like receptacles.

Genus 1. **Odonthalia.**—Frond dark red, compressed, densely cellular; tetraspores in distinct pod-like receptacles.

2. **Rhodomela.**—Frond dark red, filiform, cellular; tetraspores in swollen ramuli, or in branched pod-like receptacles.

3. **Chondria.**—Frond filiform, with a percurrent, polysiphonous, articulated axis, wrapt in a coating of cellular tissue; tetraspores scattered in the ramuli.

4. **Bostrychia.**—Frond brownish red, with a simple articulated tube, wrapt in three distinct coats of cells, of which the inner are cylindrical, the second ovate, the outer quadrate; tetraspores "in terminal lanceolate pods."

5. **Rytiphlæa.**—Frond brownish purple, axis a simple articulated tube, surrounded by a series of elongated cells, and this by a stratum of irregular cells; tetraspores in pod-like receptacles in two rows; branches transversely striate.

6. **Polysiphonia.**—Frond mostly bright red, articulated (at least when young), two to many-tubed; tetraspores in the ramuli.

7. **Dasya.**—Frond as in *Polysiphonia*, with single-tubed articulated ramuli; tetraspores in transverse bands, in stalked pod-like receptacles.

[1] The genera here constitute rather a graduating series than a family. In *Odonthalia* the structure is truly cellular, in *Rhodomela* nearly so, becoming less so in the others; and in *Polysiphonia* we find many of the species truly articulated, while others have the old fronds covered by a cellular coating.

FAM. II. **LAURENCIACEÆ.**—Frond inarticulate; tetraspores scattered in the ramuli.

Genus 8. **Bonnemaisonia.**—Frond bright red, capsules alternating with the distichous, subulate, acute ramuli.

9. **Laurencia.**—Frond brownish purple, cellular throughout; tetraspores scattered in the very obtuse ramuli.

10. **Lomentaria.**—Frond bright purple, cellular, constricted, jointed; tetraspores scattered through the ramuli; capsules spherical.

11. **Champia.**—Frond tubular, articulated, and constricted throughout; tetraspores scattered through the ramuli; capsules conical.

** *Placenta basal. Spores roundish or elliptical, in moniliform cells; every cell of the spore-thread finally changed into a spore.*

FAM. III. **CORALLINACEÆ.**—Frond calcareous, spore-threads of four spores.

Genus 12. **Corallina.**—Frond pinnated, capsules without horns.

13. **Jania.**—Frond dichotomous, capsules furnished at the summit with two articulated horns.

14. **Melobesia.**—Crustaceous or imperfectly branched, foliaceous or membranaceous; cells oblong, arranged in filiform series.

15. **Hapalidium.**—Frond membranous; cells quadrate, arranged in radiating series.

FAM. IV. **SPHÆROCOCCOIDEÆ.**—Frond cartilaginous or membranaceous, spore-threads separating into many spores.

Genus 16. **Delesseria.**—Frond membranous, with a percurrent midrib.

17. **Nitophyllum,**—Frond membranous, cells large, without a midrib, but sometimes with veins at the base; tetraspores triparted.

18. **Calliblepharis.**—Frond subcartilaginous, cells minute; tetraspores zonate.

19. **Sphærococcus.**—Frond filiform, compressed, two-edged, with an axis composed of longitudinal articulated filaments, forming an imperfect midrib, of nearly the same breadth as the frond.

20. **Gracilaria.**—Frond cellular, central cells very large.

*** *Placenta axial, or suspended by filaments in the cavity of the conceptacle.*

FAM. V. **GELIDIACEÆ.**

Genus 21. **Gelidium.**—The only one.

§ II.—NUCLEUS NOT LODGED IN A HOLLOW CONCEPTACLE.

* *Nuclei several, contained in wart-like excrescences.*

FAM. VI. **SPONGIOCARPEÆ.**—Frond filiform.

Genus 22. **Polyides.**—The only one.

FAM. VII. **SQUAMARIEÆ.**—Frond crustaceous, spreading, composed of erect, jointed, densely packed filaments.

Genus 23. **Peyssonelia.**—Tetraspores cruciate, produced in external warts.

FAM. VII. **SQUAMARIEÆ** (*continued*).

Genus 24. **Hildenbrandtia.** — Tetraspores zonate, produced within spherical conceptacles.

25. **Petrocelis.**—Central cells of the filaments convertible into cruciate tetraspores.

26. **Actinococcus.** —All the cells of the filaments convertible into tetraspores.

27. **Cruoria.**—Zonate tetraspores, produced by the metamorphosis of the entire filament.

** *Nuclei immersed in the frond.*

FAM. VIII. **HELMINTHOCLADIEÆ.**

Genus 28. **Nemalion.**—Cells in three strata, those of the axis longitudinal, capillary, dense ; of the periphery vertical, moniliform.

29. **Helminthocladia.**—Cells in two strata, those of the periphery vertical, ovate, dichotomous.

30. **Helminthora.**—Cells in three strata, those of the axis large oblong-quadrate, longitudinal ; intermediate longitudinal, more slender ; those of the periphery vertical, moniliform.

31. **Scinaia.**—Cells in three strata, of the axis capillary, longitudinal, dense ; intermediate, a few delicate capillary, vertical threads ; periphery cellular.

*** *Nuclei naked, external, involucrate.*

FAM. IX. **WRANGELIACEÆ.**

Genus 32. **Wrangelia.**—Stem single-tubed, jointed ; branches whorled at the dissepiments.

33. **Naccaria.**— Axis of large angular cells, of the periphery very minute, ramuli single-tubed, with periphery of vertical, jointed, dichotomous filaments.

SERIES II.—GONGYLOSPERMEÆ.

Sporiferous-nucleus subglabose, either simple or formed of many nucleoli. Numerous spores congregated without order in each nucleus or nucleolus.

* *Frond inarticulate, flat or cylindrical, compound.*

FAM. X. **RHODYMENIACEÆ.**—Spores developed within the cells of moniliform filaments issuing from a centre.

Genus 34. **Wormskioldia.**—Frond membranous, with a percurrent midrib ; tetraspores in simple leaf-like processes.

35. **Plocamium.**—Frond filiform, compressed ; tetraspores in branched leaf-life processes.

36. **Rhodymenia.**—Frond flat, without veins or midrib ; tetraspores cruciate, scattered under the surface of the frond.

37. **Rhodophyllis.** — Frond membranous, without veins or midrib ; tetraspores zonate, collected in sori, in the upper segments.

FAM. X. **RHODYMENIACEÆ** (*continued*).

Genus 38. **Euthora.**—Frond membranous, without veins or midrib; tetraspores cruciate, lodged in the thickened apices of the frond.

39. **Cordylecladia.** — Frond cylindrical; tetraspores quadrizonate, formed in the surface cells of pod-like receptacles.

40. **Stenogramme.**—Frond flat, without vein or midrib; conceptacles linear, occupying the centre of the segments.

41. **Dumontia.**—Frond filiform, not constricted, tubular. Tube when old empty, when young traversed by delicate longitudinal filaments; tetraspores cruciate.

42. **Catenella.**—Frond filiform, constricted, solid; tetraspores zonate.

43. **Chylocladia.**— Frond filiform, constricted, hollow; tetraspores tripartite.

FAM. XI. **CRYPTONEMIACEÆ.**— Spores developed within solitary or aggregated detached mother cells.

Genus 44. **Phyllophora.** — Irregularly cellular; tetraspores collected into sori, immersed in the frond or in proper leaflets.

45. **Gymnogongrus.**—Periphery composed of vertical, moniliform filaments; tetraspores produced in the articulations of filaments constituting external warts.

46. **Ahnfeldtia.**—Frond cylindrical, slightly branched, filiform, axis of very fine, dense, longitudinal filaments, covered by a thin stratum of vertical, moniliform filaments.

47. **Cystoclonium.**—Frond filiform, cylindrical, much branched; periphery of many series of irregular cells, zonate; tetraspores immersed in the branches.

48. **Callophyllis.**—Frond plane; spores forming numerous groups, in spherical tubercles, contained in marginal leaf-like processes.

49. **Kallymenia.**—Frond plane; spores produced in tubercles formed under the surface of the frond.

50. **Gigartina.**—Frond cartilaginous, filiform, compressed or plane, and canaliculate; filaments loosely interwoven.

51. **Chondrus.**—Frond flat, flabelliform; filaments densely compacted.

52. **Halymenia.** — Frond compressed or flat, composed of a double membrane, separated by a loose net-work of filaments.

53. **Furcellaria.** — Frond filiform, cylindrical, solid; fruit produced in the cells of the surface of the pod-like apices of the branches.

54. **Grateloupia.** — Frond filiform, compressed, pinnate; favellidia formed under the surface, with which they communicate by a terminal pore.

55. **Schizymenia.**—Frond plane, entire, subcarnoso-membranaceous.

56. **Gloiosiphonia.**—Frond filiform, tubular, much branched.

FAM. XII. **SPIRIDIACEÆ.**—Frond chambered; tetraspores external.

Genus 57. **Spiridia.**—Frond filiform, tubular; branches beset with simple, articulated ramuli.

Fam. XIII. **CERAMIACEÆ.** — Frond articulated; tetraspores immersed in the articulations.

Genus 58. **Microcladia.**—Frond cylindrical, compressed, cellular, traversed by an articulated filament.

59. **Ceramium.**—Frond filiform, cylindrical, tubular, articulated.

60. **Dudresnaia.**—Frond composed of one or more longitudinal, articulated filaments, whorled at the joints with dichotomous, moniliform filaments, whose apical cells produce tetraspores.

61. **Crouania.** — Frond composed of a single articulated filament, whorled at the joints; the tetraspores produced at the base of the whorls.

62. **Ptilota.**—Frond filiform, pectinato-pinnate, composed of a single articulated tube, at length covered by a coating of minute cells.

63. **Griffithsia.**—Fronds capillaceous, dichotomous or whorled at the joints, with dichotomous ramuli, bearing sessile tetraspores.

64. **Corynospora.** — Fronds single-tubed, articulated, dichotomous; tetraspores pedicillate, opposite the upper axils.

65. **Seirospora** — Fronds single-tubed, articulated; tetraspores produced in strings in the apical cells of the ramuli.

66. **Callithamnion.** — Fronds single-tubed, articulated, dissepiments hyaline; branches mostly pinnate.

Sub-Order II.—MELANOSPERMEÆ.

Plants with olive-coloured spores, and more or less olive-coloured fronds; cellular or articulated, or composed of articulated filaments.

Fam. XIV. **FUCACEÆ.**—Fronds inarticulate, furnished with air-vessels, the spores produced in spherical conceptacles immersed in the frond.

Genus 67. **Halidrys.**—Fronds filiform, pinnated; air-vessels many-celled, stalked.

68. **Cystoseira.**—Fronds bushy; ramuli spine-like; root scutate; air-vessels immersed.

69. **Pycnophycus.** — Frond cylindrical, slightly divided, obtuse; root fibrous; air-vessels immersed.

70. **Fucus.**—Frond linear, compressed, or flat; root scutate; air-vessels immersed.

71. **Himanthalia.**—Frond cup-shaped; root scutate; receptacles very long, strap-shaped; air-vessels none.

Fam. XV. **SPOROCHNOIDEÆ.**—Frond cellular, or with an articulated axis, covered by a cellular coating; spores formed from external articulated filaments, either free or combined into compact knob-like receptacles.

Genus 72. **Desmarestia.**—Frond cellular, distichous, filiform, compressed or flat, permeated by an articulated axis; fruit unknown.

73. **Arthrocladia.**—Frond filiform, cylindrical, permeated by an articulated filament; fruit formed in the cells of moniliform, pencilled, whorled ramuli.

FAM. XV. **SPOROCHNOIDEÆ** (*continued*).

Genus 74. **Sporochnus.**—Frond cellular; cells of the axis minute; spores produced from dichotomous radiating filaments, compacted into a lateral roundish oblong receptacle.

75. **Carpomitra.**—Frond cellular; cells of the axis minute, filiform, compressed; spores produced from dichotomous radiating filaments, compacted into mitriform, terminal receptacles.

FAM. XVI. **LAMINARIEÆ.**—Fronds cellular, with perennial stems and annual, simple, leaf-like, terminal expansions.

Genus 76. **Alaria.**—Lamina with a percurrent midrib.

77. **Laminaria.**—Lamina without a midrib.

FAM. XVII. **DICTYOTEÆ.**—Fronds cellular; cells often arranged in filiform series, cylindrical or flat; spores attached to the surface.

** *Frond tubular; tube with transverse septa.*

Genus 78. **Chorda.**—Frond filiform, cylindrical, tubular; sporiferous filaments forming a stratum over the whole frond.

§ ROOT COVERED WITH WOOLLY FILAMENTS. FROND SOLID, SOMETIMES AT LENGTH TUBULAR; TUBE CONTINUOUS.

79. **Cutleria.**—Frond flat, ribless, irregularly cleft; spores collected in dot-like sori on the surface.

80. **Haliseris.**—Frond linear, dichotomous, with percurrent midrib.

81. **Padina.**—Frond flat, ribless, flabelliform; sori arranged in concentric lines.

82. **Zonaria.**—Frond flat, "ribless, lobed, concentrically striate; sori roundish, containing spores and jointed threads."

83. **Dictyota.**—Frond flat, ribless, dichotomous or irregularly cleft; sori in dots or transverse waved lines, or scattered singly over the surface.

§§ ROOT NAKED. FROND CYLINDRICAL, BRANCHED.

84. **Stilophora.**—Spores produced at the base of moniliform filaments, which form wart-like sori on the surface.

85. **Dictyosiphon.**—Spores naked, without moniliform filaments, mostly scattered singly over the surface.

86. **Striaria.**—Spores naked, in dot-like sori, forming circular bands round the frond.

§§§ ROOT NAKED. FROND SIMPLE.

87. **Punctaria.**—Frond flat; cells quadrate.

88. **Asperococcus.**—Frond cylindrical or flat, tubular (imperfectly so in *A. compressus*); sori consisting of spores and moniliform filaments.

89. **Litosiphon.**—Fronds capillary, "cartilaginous, filiform, subsolid; spores scattered, subsolitary."

FAM. XVIII. **CHORDARIEÆ.**—Cells arranged in filamentous series; those of the axis longitudinal, of the periphery vertical, radiating.

* *Frond cylindrical, branched.*

Genus 90. **Chordaria.**—Axis dense, filaments of the periphery simple.

91. **Mesogloia.**—Axis lax; filaments of the periphery dichotomous (scarcely so in *M. Griffithsiæ*).

** *Frond spherical, lobed, or crustaceous.*

92. **Leathesia.**—Frond spherical or variously lobed.

93. **Ralfsia.**—Frond crustaceous.

*** *Parasitical, composed of free erect jointed filaments arising from a tubercular or flat base.*

94. **Elachista.**—Tubercles composed of erect dichotomous filaments.

95. **Myrionema.**—Crust composed of creeping filaments.

FAM. XIX. **SPHACELARIEÆ.**—Fronds rigid, articulated; articulations composed of numerous cells; apices often sphacelate.

Genus 96. **Cladostephus.**—Ramuli whorled.

97. **Sphacelaria.**—Ramuli distichous, mostly pinnated.

FAM. XX. **ECTOCARPEÆ.**—Fronds flaccid; articulations composed of a single cell.

Genus 98. **Ectocarpus.**—Frond branched; ramuli scattered.

99. **Myriotrichia.**—Frond simple; ramuli whorled, furnished with confervoid pellucid fibres.

Sub-Order III.—CHLOROSPERMEÆ.

Grass-green Sea-weeds, excepting a few species of *Ulvaceæ* and *Oscillatoriaceæ*, which are purple.

FAM. XXI. **SIPHONACEÆ.**—Composed of continuous (not articulated), tubular filaments, free or combined into globular or variously lobed and branched fronds.

Genus 100. **Codium.**—Frond spherical or cylindrical, simple or branched; filaments closely compacted into a spongy mass.

101. **Bryopsis.**—Filaments free, regularly pinnated.

102. **Vaucheria.**—Filaments slightly branched dichotomously or irregularly.

FAM. XXII. **CONFERVACEÆ.**—Filaments free, simple, or branched, articulated throughout.

Genus 103. **Cladophora.**—Filaments more or less branched.

104. **Rhizoclonium.**—Filaments simple, angularly bent, with short root-like processes at the angles.

105. **Conferva.**—Filaments simple, straight or curved.

106. **Ochlochæte.**—Filaments branched, decumbent, creeping, branched; each articulation generally terminating in an inarticulate bristle.

FAM. XXIII. **ULVACEÆ.**—Plants cellular, membranous, tubular, flat or filiform, green or purple.

Genus 107. **Enteromorpha.**—Frond tubular (in some varieties filiform, almost solid), green.

108. **Ulva.**—Frond flat, green.

109. **Porphyra.**—Frond flat, purple.

110. **Bangia.**—Frond filiform or linear, purple or red.

FAM. XXIV. **OSCILLATORIEÆ.**—Plants consisting of simple hyaline continuous tubes, free or combined into crustaceous or variously formed fronds, the tubes filled with annulated endochrome, which is at length separated into lenticular sporidia.

Genus 111. **Rivularia.**—Filaments not sheathed, combined into crustaceous or variously lobed fronds.

112. **Schizosiphon.**—Frond sheathed; sheath multifid, combined into crustaceous fronds.

113. **Schizothrix.**—Filaments rigid, collected into branching bundles, at length separating, combined into a flat spreading frond.

114. **Calothrix.**—Filaments short, rigid, free, attached by the base.

115. **Lyngbya.**—Filaments flaccid, elongate, attached by the base.

116. **Microcoleus.**—Filaments minute, cylindrical, enclosed in a membranous sheath.

117. **Oscillatoria.**—Filaments short, collected in lubricous strata, oscillating more or less freely.

118. **Spirulina.**—"Filaments spirally twisted, lying in a mucous stratum, vividly oscillating."

FAM. XXV. **NOSTOCHACEÆ.**—Plants consisting of "moniliform filaments, lying in a gelatinous matrix; cells globose or oval."

Genus 119. **Monormia.**—Each filament enclosed in a branching gelatinous frond.

120. **Sphærozyga.**—"Filaments free, separate, naked."

121. **Spermosira.**—"Filaments free, separate, each enclosed in a very delicate membranous filiform tube."

FAM. XXVI. **PALMELLACEÆ.**—"Cells contained in confervoid, simple or branching tubular filaments.

Genus. 122. **Hormospora.**—The only genus.

SYNOPSIS OF THE SPECIES.

Sub-Order I.—RHODOSPERMEÆ.

Fam. I.—Rhodomelaceæ.

Gen. 1. ODONTHALIA.

1. **O. dentata.** — Fronds irregularly pinnated; pinnæ deeply pinnatifid, cut and laciniated.

Gen. 2. RHODOMELA.

2. **R. subfusca.** — Much branched; branches irregular, more regularly pinnate upwards.

3. **R. lycopodioides.**— Slightly divided near the base, divisions everywhere beset with multifid filiform ramuli.

Gen. 3. CHONDRIA.

4. **C. dasyphylla.**—Much branched irregularly; ramuli short and very obtuse.

5. **C. tenuissima.**—Branches distant, long, slender; ramuli slender, attenuated to a fine point.

Gen. 4. BOSTRICHIA.

6. **B. scorpioides.**—Frond irregularly dichotomous, repeatedly pinnated upwards; apices very much involute.

Gen. 5. RYTIPHLÆA.

7. **R. complanata.**—Frond linear, compressed, pinnate or tripinnate; pinnulæ one to three times pinnatifid.

8. **R. fruticulosa.** — Frond filiform, cylindrical, bi-tripinnated; pinnules short, distichous, multifid.

9. **R. pinnastroides.** — Frond cylindrical, irregularly divided, pinnate upwards; pinnæ secund, falcate, apices incurved.

10. **R. thuyoides.**—Frond cylindrical, slightly branched; branches filiform, long, slender, with alternate pinnæ and pinnules, of nearly equal length.

Gen. 6. POLYSIPHONIA.

* *Primary tubes four to five; stems articulate throughout (not covered by cellular tissue).*

11. **P. urceolata.**—Setaceous, bright red, much branched; branches dichotomous, patent; articulations three to five times as long as broad; capsules urceolate, with a narrow mouth.

12. **P. formosa.**—Capillaceous, much branched; ramuli scattered; articulations five to ten times as long as their diameter.

13. **P. pulvinata.**—Stems from creeping filaments, erect; branches few; ramuli few, mostly simple, very patent or recurved; articulations below three to four, above not half as long as their diameter.

14. **P. fibrata.**—Capillaceous, flaccid, main branches alternate, upper mostly dichotomous, and often fastigiate, erecto-patent; articulations of the middle branches four to five times as long as their diameter; capsules broadly ovate, mostly stalked.

15. **P. spinulosa.**—Rigid, branches few, very patent, ramuli spine-like; articulations about as long as their diameter.

16. **P. Richardsoni.**—Rigid, setaceous; branches alternate, patent; ramuli few, straight, forked; articulations two to three times as long as their diameter, tubes five, spiral; capsules broadly ovate.

17. **P. Griffithsiana.**—Rigid, irregularly dichotomous, ramuli fasciculate; articulations nearly twice as long as their diameter, tubes straight, four, with four smaller in the external axils; capsules ovate or elliptical.

18. **P. elongella.**—Branches patent, dichotomous, rigid, ramuli flaccid, erecto-patent, attenuated from the base; articulations about as long as broad, tubes four, with smaller cells above; capsules ovate.

** *Primary tubes four; stem and principal branches opaque; the articulations covered with a coating of cells.*

19. **P. elongata.**—Stems stout and rigid below, flaccid above, and patent, attenuated both to the base and apex; articulations about as long as their diameter; tubes four, with four smaller in the external axils, and numerous smaller ones on the surface.

20. **P. violacea.**—Stem rather stout; branches mostly alternate, slender, capillaceo-multifid; articulations two to four times as long as their diameter; capsules ovate, stalked.

21. **P. Carmichaeliana.**—Stem rigid, flexuous; branches patent, ramuli spinoso-multifid; articulations as long as broad.

22. **P. fibrillosa.**—Brownish; cells curved, stems rather robust, excessively branched; branches capillaceo-multifid, primary siphons four, secondary four small, the rest minute; articulations about as long as their diameter.

*** *Primary tubes seven; stems opaque.*

23. **P. Brodiæi.**—Stems rigid, rather slender, much branched; branches short, capillaceo-multifid, very flaccid; articulations rather longer than broad, siphons seven, with seven smaller in the external axils, the rest minute.

**** *Primary tubes six to seven; articulations visible throughout (not covered by smaller cells).*

24. **P. variegata.**—Brownish, setaceous; stems rigid, patent; ramuli flaccid, multifid, erecto-patent; articulations about twice as long as broad, dissepiments pellucid; capsules stalked.

***** *Primary tubes eight to twenty; articulations visible throughout.*

25. **P. obscura.**—Minute; stems nearly simple, from creeping filaments; tubes about twelve; articulations shorter than their diameter.

26. **P. simulans.** — Elongated, branched; branches patent, irregularly alternate, ramuli subulate; articulations once and a half as long as their diameter.

27. **P. nigrescens.** — Stems very rigid, spinulose below, repeatedly pinnate; articulations about one and a half as long as their diameter; tubes about twenty.

28. **P. affinis.**—Stems rigid, and mostly naked below, bushy and flaccid, mostly pinnate above; articulations two to three times as long as their diameter below, upper very short; tubes about sixteen.

29. **P. subulifera.**—Very slender and flexuous, branches alternate, patent, ramuli subulate, very patent, tubes about thirteen; articulations rather longer than broad.

30. **P. atrorubescens.**—Brownish, rigid, brittle when dry; branches alternate, long, ramuli short, once or twice divided; articulations two to three times their diameter, shorter upwards; tubes spiral, about twelve.

31. **P. furcellata.**— Very slender and bushy, flexuous, dichotomous, and multifid upwards; articulations three to five times longer than their diameter.

32. **P. fastigiata.**—Slender, rigid, and fastigiate, dichotomous; articulations nearly as long as their diameter.

33. **P. parasitica.**—Slender, distichously and alternately branched; articulations about as long as their diameter, dissepiments pellucid; tubes about fifteen.

34. **P. byssoides.** — Capillaceous, distichously branched; branches close, ramuli dichotomous, single-tubed, byssoid; articulations variable, scarcely as long as their diameter.

Gen. 7. DASYA.

35. **D. coccinea.**— Fronds bipinnate, pinnules dichotomously multifid, main stem densely clothed with short, rigid, articulated fibres, stichidia oblong.

36. **D. arbuscula.**—Irregularly dichotomous, everywhere beset with patent, dichotomous ramuli, of equal length; articulations three to four times longer than their diameter, stichidia elliptic, oblong.

37. **D. venusta.**—Repeatedly pinnate, everywhere clothed above by many times dichotomous ramuli; articulations five to six times longer than their diameter, stichidia ovate-acuminate.

38. **D. ocellata.**—Very slightly divided, beset on all sides with long, slender, two to three times dichotomous ramuli, bearing linear, acuminate stichidia, their articulations three to four times longer than their diameter.

Fam. II.—Laurenciaceæ.

Gen. 8. BONNEMAISONIA.

39. **B. asparagoides.**—Irregularly branched, all the branches fringed with rigid, distichous cilia, with which the capsules alternate.

Gen. 9. LAURENCIA.

40. **L. obtusa.**—Filiform, cylindrical, repeatedly pinnate; pinnæ and pinnulæ mostly opposite, the latter short, very obtuse.

41. **L. pinnatifida.**—Compressed, linear, alternately bi-tripinnatifid, ultimate segments obtuse.

42. **L. cæspitosa.**— Mostly cylindrical, repeatedly pinnate, and mostly distichous, proliferous innovations sometimes inserted on all sides; pinnæ slightly thickened upwards, apices obtuse.

Gen. 10. LOMENTARIA.

43. **L. ovalis.** — Stems solid, sparingly and irregularly branched, beset upwards with simple, hollow, often-jointed ramuli.

44. **L. kaliformis.**—Tubular throughout, constricted at distant intervals, repeatedly whorled at the constrictions.

45. **L. reflexa.**—Fronds from creeping, distantly constricted filaments, simple or with a few simple branches, constrictions rather longer than their diameter.

Gen. 11. CHAMPIA.

46. **C. parvula.** — Irregularly branched, constricted at intervals nearly equal to the diameter.

Fam. III.—Corallinaceæ.

Gen. 12. CORALLINA.

47. **C. officinalis.**—Fronds bi-tripinnated, articulated; upper articulations obovate or obconical, their upper angles rounded, ultimate ramuli obtuse.

48. **C. squamata.**—Upper articulations much dilated upwards, the angles very acute, ultimate joints acuminated.

Gen. 13. JANIA.

49. **J. rubens.**—Articulations of the branches cylindrical, upper angles rounded.

50. **J. corniculata.**—Articulations of the branches obconical, the angles acute, often very much produced.

Gen. 14. MELOBESIA.

51. **M. polymorpha.**—Frond crustaceous, attached by its under surface, plane or rising into short papillose branches.

52. **M. calcarea.**—Not attached, irregularly branched; branches short, cylindrical, very patent.

53. **M. fasciculata.**—Unattached, lobed or branched; branches cylindrical, or thickened upwards and compressed; apices truncate or even concave.

54. **M. agariciformis.**—"Unattached, globular, hollow; foliations delicate, papyro-crustaceous, dense, erect, much lobed and sinuate, fastigiate, margin thin, entire."—*Harvey.*

55. **M. lichenoides.**—Frond attached by the centre, margin free, foliaceous and spreading, lobed; lobes rounded.

56. **M. membranacea.**—Minute, dot-like, very thin, at length confluent, parasitical.

57. **M. farinosa.**—Small, roundish, slightly convex; ceramidia one or two, rather large.

58. **M. verrucata.**—Small, thin, almost plane; ceramidia very numerous and minute.

59. **M. pustulata.**—Rather thick, plane, outline irregular; ceramidia large and prominent.

Gen. 15. HAPALIDIUM.

60. **H. phyllactidium.**—Minute, dot-like series of cells, dichotomous, in one layer.

Fam. IV.—Sphærococcoideæ.

Gen. 16. DELESSERIA.

61. **D. alata.**—Linear, much branched dichotomously, winged throughout with a narrow membrane; midrib pinnate, with opposite simple nerves. β. Membranaceous wings obsolete.

62. **D. hypoglossum.**—Linear-lanceolate, repeatedly proliferous from the midrib.

63. **D. ruscifolium.**—Oblong, obtuse at each end; leaflets traversed by oblique, pellucid, anastomosing striæ.

64. **D. sinuosa.**—Stem cylindrical, filiform, branched; branches upwards, winged with broad, obovate, oblong or lanceolate leaves, sinuate or pinnatifid, the divisions often becoming leaf-like, transversely ribbed, with oblique opposite veins.

Gen. 17. NITOPHYLLUM.

65. **N. Bonnemaisoni.**— Stem short, cylindrical; frond flabelliform, rounded, irregularly cleft; segments obcuneate, obscurely veined at the base; sori scattered over the whole frond.

66. **N. Gmelini.**—Stem very short, suddenly expanding into a broad flabelliform frond, divided into broad rounded segments, waved at the margins, base marked with branching veins; sori linear-marginal.

67. **N. Hilliæ.**—Stem very short; frond roundish, deeply divided into oblong lobes; apices obtuse; frond much veined at the base; sori scattered, minute.

68. **N. laceratum.**—Stem scarcely any; frond much divided; segments broadly linear, the apices entire, bifid, or laciniated, much veined at the base; tetraspores marginal or contained in minute leaf-like expansions.

69. **N. punctatum.**—Oblong or obovate, divided upwards into three or more principal segments; axils much rounded; apices bifid or laciniated, sometimes regularly dichotomous from the base; the segments linear or oblong; sori scattered over the whole surface of the frond.

70. **N. versicolor.**—Stem distinct, cylindrical; frond roundish, flabelliform, divided almost to the base; segments when mature have callosities at the tips.

Gen. 18. CALLIBLEPHARIS.

71. **C. ciliata.**—Frond simple or with proliferous marginal processes, elliptical, oblong or lanceolate, all the margins ciliated with coarse dentate or branched cilæ.

72. **C. jubata.**—Linear or linear-lanceolate; the margins upwards much divided into long linear, simple or branched proliferous processes, which are often filiform and clasping, the margins, and frequently the disc, beset with short rigid simple or branched ciliæ.

Gen. 19. SPHÆROCOCCUS.

73. **S. coronopifolius.**—Filiform, compressed, two-edged, excessively branched dichotomously; the margin fringed with fructiferous ciliæ.

Gen. 20. GRACILARIA.

74. **G. confervoides.**—Filiform, cylindrical, simple or slightly branched, long and slender; tubercles roundish, scattered over the whole frond.

75. **G. compressa.**—Linear, compressed, very flaccid, much branched irregularly, segments acute; tubercles conical.

76. **G. multipartita.**—Plane or compressed, linear, much branched dichotomously; segments linear, or slightly widened upwards, obtuse, often multifid; tubercles conical, rounded.

Fam. V.—Gelidiaceæ.

Gen. 21. GELIDIUM.

77. **G. cartilagineum.**—Linear, three or four times pinnated; pinnæ and pinnulæ short, alternate; apices obtuse or incrassated.

78. **G. corneum.**—Linear, cylindrical, compressed or flat, simple, two or three times pinnated or irregularly branched; branches elongate, acute or obtuse.

Fam. VI.—Spongiocarpeæ.

Gen. 22. POLYIDES.

79. **P. rotundus.**—Filiform, cylindrical, dichotomous; apices obtuse.

Fam. VII.—Squamarieæ.

Gen. 23. PEYSSONELIA.

80. **P. Dubyi.**—Membranous, thin, rooting by its under surface.

Gen. 24. HILDENBRANDTIA.

81. **H. rubra.**—Crustaceous, thin, adhering by its under surface, without radicles.

Gen. 25. PETROCELIS.

82. **P. cruenta.**—The only species.

Gen. 26. CRUORIA.

83. **C. adhærens.**—The only species.

Gen. 27. ACTINOCOCCUS.

84. **A. Hennedyi.**—The only species.

Fam. VIII.—Helminthocladiæ.

Gen. 28. NEMALEON.

85. **N. multifidum.**—Filiform, cylindrical, sparingly divided dichotomously; axils wide.

Gen. 29. HELMINTHOCLADIA.

86. **H. purpurea.**—Mostly simple, beset with long cylindrical branches, which are again beset with similar branches.

Gen. 30. HELMINTHORA.

87. **H. divaricata.**—Filiform, excessively branched; branches generally alternate, much divaricated.

Gen. 31. SCINAIA.

88. **S. furcellata.**—Filiform, cylindrical, dichotomous, obtuse.

Fam. IX.—Wrangeliaceæ.

Gen. 32. WRANGELIA.

89. **W. multifida.**—Setaceous, each joint whorled with numerous short incurved ramuli.

Gen. 33. NACCARIA.

90. **N. Wigghii.**—Frond cylindrical; branches irregular, subalternate, attenuated; ramuli spindle-shaped, quadrifarious.

Fam. X.—Rhodymeniaceæ.

Gen. 34. WORMSKIOLDIA.

91. **W. sanguinea.**—Bright red, membranous, with a percurrent midrib, pinnated with lateral opposite branched veins.

Gen. 35. PLOCAMIUM.

92. **P. coccineum.**—Linear, compressed, much branched distichously; ultimate ramuli mostly in fours, pectinato-secund on the upper edges of the branches.

Var. β, **uncinata.**—Very small, branches flexuous, entangled; ultimate ramuli patent or recurved.

Gen. 36. RHODYMENIA.

93. **R. palmetta.**—Stem short; frond plane, membranous, bright red, several times dichotomously branched; axils rounded; segments linear oblong.

94. **R. palmata.**—Fronds coriaceous, slightly and irregularly divided, often fringed with proliferous laciniæ, dark red or brownish red; sometimes linear and multifid.

Gen. 37. RHODOPHYLLIS.

95. **R. bifida.**—Rather tender, membranous, repeatedly divided into many linear or obcuneate obtuse segments.

Gen. 38. EUTHORA.

96. **E. cristata.** — Membranous, much divided dichotomously or irregularly; segments linear, or narrowed upwards; apices acute or laciniated.

Gen. 39. CORDYLECLADIA.

97. **C. erecta.**—Filiform, rigid, sparingly dichotomous; tetraspores in pod-like receptacles, tubercles clustered on the branches.

Gen. 40. STENOGRAMME.

98. **S. interrupta.**—Linear, compressed, dichotomous; segments obtuse.

Gen. 41. DUMONTIA.

99. **D. filiformis.**—Filiform, attenuated at each end, irregularly branched from near the base, simple, or occasionally emitting a few proliferous branches, sometimes in bundles.

Gen. 42. CATENELLA.

100. **C. opuntia.**—Fronds from creeping filaments, slightly branched, constricted at short intervals.

Gen. 43. CHYLOCLADIA.

101. **C. articulata.**—Tubular, constricted, branched from the constrictions; branches sometimes imperfectly whorled; capsules conical.

102. **C. clavellosa.**—Frond linear, not constricted, repeatedly pinnate, distichous; pinnæ and pinnulæ attenuated at each end; capsules urceolate.

103. **C. rosea.**—Much compressed, and as well as the segments elliptic oblong.

Fam. XI.—Cryptonemiaceæ.

Gen. 44. PHYLLOPHORA.

104. **P. rubens.**—Stemless, linear or somewhat obcuneate, repeatedly proliferous from the midrib.

105. **P. membranifolia.**—Dark purple; stem elongated and branched, cylindrical, ending in roundish flabelliform membranous expansions, cut and lobed; tubercles stalked, produced on the stem.

106. **P. Brodiæi.**—Bright red; stem elongated, cylindrical and branched, expanding near the apex into a thin membranous frond, roundish, flabelliform, divided into obcuneate lobes; the axils wide; the apices bearing sessile spherical tubercles.

107. **P. palmettoides.**—Stem short, simple or slightly branched, expanding into an oblong or obcuneate flat frond, simple or once forked; sori imbedded near the apices of the fronds.

Gen. 45. GYMNOGONGRUS.

108. **G. Griffithsiæ.**—Filiform, cylindrical, simple or repeatedly and dichotomously branched.

109. **G. Norvegicus.**—Linear, flat, dichotomous; apices rounded, obtuse.

Gen. 46. AHNFELDTIA.

110. **A. plicata.**—Filiform, cylindrical, irregularly branched.

Gen. 47. CYSTOCLONIUM.

111. **C. purpurascens.**—Filiform, cylindrical, much and irregularly branched; ramuli capillaceo-multifid.

Gen. 48. CALLOPHYLLIS.

112. **C. laciniata.**—Frond roundish, flabelliform, much divided in a subdichotomous manner; segments obcuneate, rounded; tubercles contained in the marginal ciliæ.

Gen. 49. KALLYMENIA.

113. **K. reniformis.**—Frond thin, brownish red, roundish, reniform, simple or very slightly divided, sometimes proliferous at the margins.

Gen. 50. GIGARTINA.

114. **G. pistillata.**—Filiform, compressed, much branched upwards in an irregularly dichotomous, subflabelliform manner; branches patent or erecto-patent, obtuse or flattened at the apices.

115. **G. acicularis.**—Frond filiform, cylindrical; branches irregularly pinnate or dichotomous, very patent; apices acuminated.

116. **G. Teedii.**—Linear, flat, much branched from the base ; branches distichous, irregular, opposite or alternate ; ramuli short, spine-like, compressed.

117. **G. mamillosa.**—Linear or obcuneate, more or less canaliculate, at least when in fruit ; tubercles scattered over the whole surface, somewhat stalked, generally abundant.

Gen. 51. CHONDRUS.

118. **C. crispus.**—Flat, obcuneate, dichotomous and flabelliform upwards, or linear, compressed ; apices obtuse, emarginate or acute.

Gen. 52. HALYMENIA.

119. **H. ligulata.**—Flat, dichotomous, often proliferous from the disc and margin, roundish and very slightly, or linear and much divided.

Gen. 53. FURCELLARIA.

120. **F. fastigiata.**—Filiform, cylindrical, dichotomous, bushy.

Gen. 54. GRATELOUPIA.

121. **G. filicina.**—Linear, flat, tapering to each end, bipinnate.

Gen. 55. SCHIZYMENIA.

122. **S. Dubyi.**—Membranous, flat, roundish oblong or obovate, entire or often split to the base into more or less linear laciniæ.

123. **S. edulis.**—Carnoso-cartilaginous, obovate, gradually tapering into a short stem.

Gen. 56. GLOIOSIPHONIA.

124. **G. capillaris.**—Filiform, cylindrical, tapering towards each end, repeatedly and irregularly branched ; branches patent, very flaccid.

Fam. XII.—Spyridiaceæ.

Gen. 57. SPIRIDIA.

125. **S. filamentosa.**—Filiform, cylindrical, tubular, jointed, three or four times very irregularly branched.

Fam. XIII.—Ceramiaceæ.

Gen. 58. MICROCLADIA.

126. **M. glandulosa.**—Distichous, irregularly dichotomous ; apices acute.

Gen. 59. CERAMIUM.

* *Cells lined throughout with coloured cellules.*

127. **C. rubrum.**—Rather stout, attenuated from the base, irregularly dichotomous, with numerous short, lateral dichotomous ramuli ; apices incurved, unarmed ; colour purple.

128. **C. Botryocarpum.**—Somewhat geniculated at the base, rather stout, tapering, irregularly dichotomous ; lateral ramuli mostly simple ; apices straight ; joints without spines.

** *Internodes hyaline, not lined with coloured cellules.*

129. **C. decurrens.**—Rather stout, attenuated from the base, regularly dichotomous, with rather short, lateral, once or twice dichotomous ramuli, a band round the middle of the articulation alone hyaline, the rest lined by coloured cellules ; apices incurved.

130. **C. Deslongchampii.**—Very slender, irregularly dichotomous ; apices straight ; the greater part of the internodes hyaline ; joints coloured.

131. **C. diaphanum.**—Very slender, irregularly dichotomous ; joints swollen, coloured ; internodes hyaline ; favellæ mostly terminal.

132. **C. gracillimum.**—Excessively slender and flaccid, furnished throughout with short, repeatedly dichotomous ramuli ; articulations six to seven times longer than their diameter, pellucid ; the dissepiments swollen and coloured.

133. **C. strictum.**—Very slender, scarcely tapering, lateral ramuli mostly wanting ; apices of the branches forked, occasionally somewhat incurved ; articulations about four times as long as their diameter.

134. **C. nodosum.**—Extremely slender, irregularly dichotomous, often secund, especially upwards, scarcely tapering ; articulations four or five times their diameter ; "tetraspores erumpent from the outer edge of short accessory ramuli."

135. **C. fastigiatum.**—Densely tufted, much branched, dichotomous, filaments scarcely tapering ; branches very erect ; apices forked, and slightly incurved ; articulations four to six times their diameter, suffused with a fine purple colour, but not covered with cellules.

*** *Internodes covered with coloured cellules ; nodes armed with spines or ciliæ.*

136. **C. flabelligerum.**—Rather stout, irregularly dichotomous, attenuated upwards, with numerous, short, lateral, once or twice divided ramuli, which are attenuated to the base and apex, and slightly curved ; articulations nearly twice their diameter, the upper with a short three-jointed spine on the outer edge.

**** *Internodes pellucid ; nodes ciliated.*

137. **C. echionotum.**—Densely tufted, dichotomously branched ; apices forked, incurved ; upper nodes armed with fusiform, pellucid, single-jointed ciliæ.

138. **C. acanthonotum.**—Densely tufted, dichotomous ; internodes three to five times their diameter ; nodes furnished with a stout, conical, three-jointed coloured spine on the outer edge.

139. **C. ciliatum.**—Very slender, scarcely tapering ; the nodes furnished with a row of stout, fusiform, pellucid, three-jointed ciliæ, the lowest joint of which is very large, the upper two very minute ; tetraspores alternating with the ciliæ.

Gen. 60. DUDRESNAIA.

140. **D. coccinea.**—Very flaccid, filiform, irregularly and somewhat alternately branched ; densely whorled with dichotomous ramuli, the upper joints of which are converted into tetraspores.

Gen. 61. CROUANIA.

141. **C. attenuata.**—Filiform, alternately pinnated ; joints three or four times their diameter, each joint furnished with a dense whorl of short dichotomously multifid ramuli, the lower joints of which are converted into tetraspores.

Gen. 62. PTILOTA.

142. **P. plumosa.**—Linear, compressed, irregularly branched; branches bi-tripinnate, covered with a coating of cells throughout.

143. **P. elegans.**—Smaller in all its parts, more delicate and flaccid than the last; the young fronds and ramuli composed of the articulated axis, the older covered by a coating of cellular tissue.

Gen. 63. GRIFFITHSIA.

144. **G. equisetifolia.**—Stems rather stout; ramuli whorled, at length closely imbricated, dichotomous, incurved; receptacles of the tetraspores stalked.

145. **G. barbata.**—Slender, dichotomously branched; articulations clavate; the upper ones with whorled, or opposite, dichotomous ramuli, bearing sessile tetraspores.

146. **G. Devoniensis.**—Very slender and flaccid, dichotomous; lower branches patent, upper rather erect; articulations cylindrical, six to eight times as long as their diameter; tetraspores attached to the inner edge of incurved involucral ramuli, whorled round the joints.

147. **G. corallina.**—Very flaccid, dichotomous; branches patent; involucres of the tetraspores whorled, very short, spine-like, and incurved; those of the favellæ secund.

148. **G. secundiflora.**—Irregularly dichotomous, somewhat flabellate upwards; ramuli cylindrical; apices very obtuse; articulations two to four times as long as broad.

149. **G. setacea.**—Setaceous, rigid, dichotomous; articulations cylindrical, five or six times longer than their diameter; both kinds of fruit pedunculate, lateral.

Gen. 64. CORYNOSPORA.

150. **C. pedicellata.**—Filiform, cylindrical, dichotomous, beset from near the base with short once or twice dichotomous ramuli; spores opposite the axils.

Gen. 65. SEIROSPORA.

151. **S. Griffithsiana.**—Very slender, setaceous; branches scattered, shorter upwards, very patent; articulations lined with veins.

Gen. 66. CALLITHAMNION.

* *Ramuli opposite.*

152. **C. plumula.**—Distichous, dichotomous, pinnated; pinnæ bipectinated on their upper edge.

153. **C. cruciatum.**—Irregularly branched; each joint of the branches furnished with two to four slender pinnated ramuli; tetraspores formed from the lower pinnæ.

154. **C. floccosum.**—Very slender and irregularly branched; branches distant, each joint having at its summit two simple, minute, subulate ramuli, the bases of which are pinnated with tetraspores.

155. **C. Turneri.**—Filaments from creeping fibres, simple, or two or three times pinnated; pinnæ very irregular, distant, very patent, scarcely tapering; articulations five to ten times longer than their diameter; favellæ stalked, involucrated.

156. **C. barbatum.**—Slender, scarcely tapering; branches mostly alternate, simple, naked or pinnated, with minute spine-like ramuli; articulations twice or thrice their diameter.

157. **C. pluma.**—Stems erect, from creeping filaments, naked below, closely pectinato-pinnate above, with short opposite ramuli; articulations about two to four times their diameter.

*** Stems shrubby, robust, more or less opaque; ramuli alternate.*

158. **C. arbuscula.**—Stout, much branched and bushy upwards; ramuli pinnate with alternate, mostly simple, slender, recurved pinnules, sessile; spherical tetraspores on the outer edge; articulations twice their diameter.

159. **C. Brodiæi.**—Stems opaque with veins, slightly branched, rather rigid; branches dense, quadrifarious, pinnulæ patent or recurved; the ultimate ones with tetraspores arranged on the upper edge of short secund spine-like plumules.

160. **C. tetragonum.**—Stem mostly percurrent, opaque at the base, three to four times somewhat quadrifariously branched, bi-tripinnated; ultimate pinnulæ erect, clavate; their articulations once or twice, those of the branches two to three times their diameter; favellæ terminal; tetraspores spherical, sessile, on the upper edge and near the apex of the plumules.

161. **C. brachiatum.**—Stem slender, rigid, opaque at the base; the ultimate plumules not attenuated at the base, and tapering gradually to a point.

162. **C. tetricum.**—Stems rather stout, mostly percurrent, shaggy at the base, much branched upwards; all the branches furnished with once or twice pinnated ramuli; pinnules acute, tapering to the base and apex; articulations two to three times their diameter; tetraspores elliptical, sessile on the upper edge of short spine-like processes of the pinnules.

163. **C. Hookeri.**—Stem opaque, much branched; branches flexuous, somewhat alternate, mostly naked at the base, bi-tripinnated upwards; articulations two to three times their diameter; tetraspores numerous, spherical, sessile on the upper edges of the ramuli.

*"*** Main stems slender, evidently jointed; branches decompound pinnate; ramuli alternate."*

164. **C. roseum.**—Irregularly, mostly alternately branched; branches long, somewhat flexuose, distichous, slightly incurved; articulations four to five times their diameter; tetraspores serrated on the upper edge of each pinnule.

165. **C. byssoideum.**—Very slender, flaccid and byssoid, much branched, once or twice irregularly alternately pinnate; articulations six to eight times their diameter, shorter upwards; tetraspores few, sessile near the base of the pinnules.

166. **C. polyspermum.**—Much tufted and irregularly branched; branches distichous, and once or twice pinnate upwards; stem slightly veined at the base; tetraspores spherical, sessile on the upper edge of the pinnules; articulations four to five times their diameter, shorter upwards.

167. **C. fasciculatum.**—"Plumules long, erect, linear-obovate, truncate; pinnæ flexuous, the lower simple, appressed, the upper erecto-patent, ramulose near the tip; articulations of the branches veiny, thrice those of the ramuli, once or twice as long as broad, with contracted dissepiments."

168. **C. Borreri.**—Much branched ; branches distichous, regularly pinnated with alternate plumules, naked at the base, simply pinnated towards the top ; articulations two to five times their diameter, shorter upwards as are the pinnæ.

169. **C. affine.**—Much branched and bushy ; stem veiny ; secondary branches long, densely plumulate ; plumules very narrow, simply pinnate ; pinnæ short, erect, the upper longest, crowded at the tips ; articulations of the branches three to four, of the pinnæ once and a-half as long as broad ; tetraspores solitary, super-axillary.

170. **C. tripinnatum.**— " Distichous, capillary, decompound pinnate ; plumules obovate, tripinnate above, the lower pinnæ short and abortive, each pinna having at its axil a minute pinnule ; tetraspores oval, lateral on the axillary pinnules."

171. **C. gracillimum.**—Capillaceous, much branched ; branches distichous, repeatedly pinnate, alternate ; articulations three to five times their diameter, shorter upwards ; tetraspores terminal on the upper pinnules, roundish, solitary.

172. **C. thuyoideum.**—Much branched distichously ; branches bi-tripinnated, very slender ; articulations three to six times their diameter ; tetraspores terminal on the pinnules.

**** "*Stems articulate ; branches and ramuli dichotomous.*"

173. **C. corymbosum.**—Somewhat flaccid, much branched ; branches mostly alternate, very slender and capillaceous, repeatedly dichotomous upwards ; articulations eight to ten times their diameter.

174. **C. granulatum.**—Stem stout, percurrent, veiny below, much branched, rather flaccid ; all the branches thickly set with capillaceo-multifid, dichotomous ramuli ; articulations about twice their diameter, the dissepiments constricted.

***** "*Of small size, and densely tufted, or minute parasites.*"

175. **C. Rothii.**—Densely cæspitose, simple or two to three times dichotomous, very erect and straight ; articulations twice their diameter ; tetraspores clustered on short, erecto-patent, terminal, corymbose ramuli.

176. **C. floridulum.**—Tufts hemispherical ; filaments slender, dichotomous, erect ; articulations about thrice their diameter ; tetraspores secund, stalked, seriated along the branches.

177. **C. mesocarpum.** — Stems from creeping filaments, erect, slightly branched ; branches alternate, simple or nearly so ; articulations four to five times their diameter ; tetraspores on simple or forked lateral pedicels.

178. **C. sparsum.**—Parasitical, minute, tufted or cæspitose, simple or slightly and alternately branched ; branches erecto-patent, of unequal length ; articulations two to three times their diameter.

179. **C. Daviesii.**—Densely cæspitose, nearly simple or much branched ; branches alternate, ramelli pectinato-secund on the upper edge, and near the base of the ramuli ; articulations thrice their diameter ; tetraspores terminal on the ramelli.

Sub-Order II.—MELANOSPERMEÆ.

Fam. XIV.—Fucaceæ.

Gen. 67. HALIDRYS.

180. **H. siliquosa.**—Linear, branches alternately pinnated or bipinnated; air-vessels compressed, linear-lanceolate, mucronate.

Gen. 68. CYSTOSEIRA.

181. **C. ericoides.**—Stem stout, smooth, cylindrical, short; frond repeatedly and alternately pinnated; vesicles few, elliptical; conceptacles armed each with a subulate spine.

182. **C. granulata.**—Stem covered by the knob-like bases of the branches; branches filiform, alternately bi-tripinnated, somewhat irregularly; air-vessels single or in pairs, often subtending an axil, numerous.

183. **C. barbata.**—Stem cylindrical, rather slender, covered by the knob-like bases of the branches; branches filiform, slender, once or twice pinnated; ultimate ramuli mostly dichotomous; vesicles few, mostly single; receptacles small, oblong, scarcely spinose.

184. **C. fæniculacea.**—Stem compressed, covered upwards with spine-like processes; branches repeatedly pinnated; receptacles minute, smooth, linear-lanceolate.

185. **C. fibrosa.**—Stem filiform; branches repeatedly pinnated, and covered with linear, simple or forked leaf-like processes, which are furnished with a midrib; receptacles long, linear, covered with spine-like processes.

Gen. 69. PYCNOPHYCUS.

186. **P. tuberculatus.**—Cylindrical, thickened upwards, obtuse, irregularly dichotomous; vesicles single in the upper ramuli.

Gen. 70. FUCUS.

187. **F. vesiculosus.**—Linear, flat, dichotomous, midrib stout, percurrent; vesicles in pairs, or in linear series on each side of the midrib, often wanting; receptacles terminal, single, roundish or lanceolate, and forked.

188. **F. ceranoides.**—Somewhat membranous, midrib narrow, dichotomous, without vesicles; receptacles lateral, lanceolate, simple or forked, corymbose.

189. **F. serratus.**—Linear, flat, midrib broad; margin serrated; receptacles immersed in the terminal branches.

190. **F. nodosus.**—Slightly compressed, without midrib, irregularly dichotomous; vesicles innate; receptacles stalked, single or several together, arising from the axils of minute marginal teeth.

191. **F. Mackaii.**—Filiform, subcompressed, irregularly dichotomous, without lateral teeth; receptacles stalked, single or in pairs among the lower branches.

192. **F. canaliculatus.**—Linear, flat, dichotomous, without midrib or vesicles, channelled; receptacles terminal, forked, or in pairs.

Gen. 71. HIMANTHALIA.

193. **H. lorea.**—Frond cup-shaped, stalked, receptacles from the cup, linear-elongate, repeatedly dichotomous.

Fam. XV.—**Sporochnoideæ.**

Gen. 72. DESMARESTIA.

194. **D. ligulata.**—Flat, linear or lanceolate, repeatedly pinnate; pinnæ and pinnules opposite, attenuated at each end.

195. **D. aculeata.**—Compressed, linear, very slender, repeatedly and alternately pinnated, fringed, when young, with confervoid filaments; when old, margined with spines.

196. **D. viridis.**—Filiform, cylindrical, repeatedly and oppositely pinnated: ramuli, when young, articulated, somewhat tufted.

Gen. 73. ARTHROCLADIA.

197. **A. villosa.**—Filiform, slender, repeatedly pinnated; pinnæ opposite, distant; whorls of filaments distant, about two and a-half times their diameter.

Gen. 74. SPOROCHNUS.

198. **S. pedunculatus.**—Stem percurrent, much branched, with long, slender, simple, very patent, and capillaceous branches; receptacles at first roundish sessile, at length oblong, stalked.

Gen. 75. CARPOMITRA.

199. **C. cabreræ.**—Irregularly dichotomous, linear, narrow, flat, with an indistinct midrib, frequently constricted.

Fam. XVI.—**Laminarieæ.**

Gen. 76. ALARIA.

200. **A. esculenta.**—Oblong-lanceolate, midrib narrow, subcylindrical; fructiferous leaflets linear-obovate, compressed upwards, cylindrical at the base.

Gen. 77. LAMINARIA.

201. **L. digitata.**—Stem elongate, cylindrical at the base, tapering upwards, and compressed at the summit, suddenly expanding into an oblong frond, cleft nearly to the base into many linear segments.

202. **L. bulbosa.**—Stem flattened, with a waved more or less membranous margin, in which are imbedded the minute spores; frond oblong, cleft into many linear segments.

203. **L. longicruris.**—Stem very long, cylindrical, thickest in the middle, tubular; frond ovate, somewhat membranous, margin waved; apex rounded, obtuse.

204. **L. saccharina.**—Stem cylindrical, scarcely tapering; frond lanceolate, generally crisped and waved in the centre.

205. **L. phyllitis.**—Frond flaccid, membranous, linear or linear-lanceolate, entire.

206. **L. fascia.**—Stem very short, scarcely any; frond rigid, linear, oblong or obcuneate, often very irregular in outline.

Fam. XVII.—**Dictyoteæ.**

Gen. 78. CHORDA.

207. **C. filum.**—Filiform, cylindrical, entire, very long, not marked by external constrictions.

208. **C. lomentaria.**—Marked by external constrictions at long and irregular distances.

Gen. 79. CUTLERIA.

209. **C. multifida.**—Flat, much cut from the base into linear-flabelliform segments, which are obtuse, acute or laciniate.

Gen. 80. HALISERIS.

210. **H. polypodioides.**—Flat, linear, dichotomous, with a linear-percurrent midrib; margin entire, at length cut into broad laciniæ.

Gen. 81. PADINA.

211. **P. Pavonia.**—Flat, flabelliform, entire or cut into numerous obcuneate rounded segments, and marked with darker concentric bands.

Gen. 82. ZONARIA.

212. **Z. collaris.**—Flat, procumbent, roundish, "emitting from the upper surface cup-shaped, membranaceous fronds, the under surface rooting, densely stupose."

213. **Z. parvula.**—Procumbent, membranaceous, attached by fibres from the central parts of the lower surface, variously lobed; lobes free.

Gen. 83. DICTYOTA.

214. **D. atomaria.**—Flat, obcuneate, entire or more or less cleft into linear or obcuneate segments; the apices entire or laciniated; spores in darker transverse waved lines.

215. **D. dichotoma.**—Flat, flabelliform, repeatedly dichotomous; segments linear; axils rounded; apices truncate or emarginate.

Gen. 84. STILOPHORA.

216. **S. rhizodes.**—Filiform, cylindrical, solid (tubular in age), much branched, irregularly dichotomous; apices acute; fruit wart-like; tubercles scattered over the whole frond.

217. **S. Lyngbyæi.**—Tubular, much distended in age; tubercles arranged in a spiral round the stem and branches.

Gen. 85. DICTYOSIPHON.

218. **D. fæniculaceus.**—Setaceous, much branched; branches scattered, capillaceo-multifid, solid when young, tubular when old; surface covered with confervoid filaments.

Gen. 86. STRIARIA.

219. **S. attenuata.**—Filiform, attenuated to each end, repeatedly branched; branches opposite or ternate, all attenuated to each end.

Gen. 87. PUNCTARIA.

220. **P. latifolia.**—Flat, oblong or obovate, with a short cylindrical stem; very flaccid.

221. **P. plantaginea.**—Linear-lanceolate or broadly lanceolate, attenuated to a very short stem; the apex rather obtuse.

222. **P. tenuissima.**—Linear-lanceolate; very thin and delicate; tapering from a little above the base to an obtuse point.

Gen. 88. ASPEROCOCCUS.

223. **A. compressus.**—Flat, linear-lanceolate, simple ; tapering at the base into an imperfect stem ; apex obtuse ; the surface rough with the sori.

224. **A. Turneri.**—Linear cylindrical, inflated, simple, tapering suddenly at the base into a short stem ; apex very obtuse, often here and there imperfectly constricted.

225. **A. echinatus.**—Filiform, attenuated towards each end, inflated, irregularly constricted at intervals, simple.

Gen. 89. LITOSIPHON.

226. **L. pusillus.**—Parasitical, minute, capillaceous, simple, tapering to an acute point, scattered and cæspitose.

227. **L. laminariæ.**—Minute, tufted, filiform, somewhat clavate, banded across, often with a few hairs at the apex.

Fam. XVIII.—Chordarieæ.

Gen. 90. CHORDARIA.

228. **C. flagelliformis.** — Filiform, cylindrical, scarcely tapering, much branched ; branches scattered, mostly simple, obtuse.

229. **C. divaricata.**—Much branched ; branches patent, simple at the base, numerous upwards, short and divaricated ; apical cell of the filaments of the periphery very large.

Gen. 91. MESOGLOIA.

230. **M. vermicularis.**—Filiform, much and irregularly branched ; branches patent, stout, obtuse, of unequal thickness.

231. **M. Griffithsiæ.**—Slender, sparingly branched ; branches very patent, with a few scattered, short, very patent, mostly simple ramuli.

232. **M. virescens.**—Slender, much branched ; branches long, equal, with numerous often crowded, very patent, mostly simple ramuli.

Gen. 92. LEATHESIA.

233. **L. tuberiformis.**—Roundish or imperfectly lobed ; centre when young filled with loose fibres, at length hollow.

234. **L. Berkeleyi.**—Crustaceous, convex, solid, soft and flaccid.

Gen. 93. RALFSIA.

235. **R. verrucosa.**—Crustaceous, scarcely convex, dark brown ; centre wrinkled ; margin concentrically zoned.

Gen. 94. ELACHISTA.

236. **E. fucicola.**—densely tufted ; tubercular base hemispherical ; filaments elongate, attenuated upwards ; articulations rather longer than their diameter.

237. **E. flaccida.**—Tufts small ; base hemispherical ; filaments elongate, attenuated at the base ; lower articulations half their diameter, upper gradually a little longer.

238. **E. curta.**—Tufts very minute ; filaments rather short, somewhat clavate ; articulations nearly uniform, about as long as broad : spores pyriform on long stalks.

239. **E. stellulata.**—Extremely minute ; tubercle of few large cells ; filaments rather short, slightly thickened upwards, obtuse ; articulations about twice their diameter.

240. **E. scutulata.**—Base large, slightly convex ; filaments short, capillary, obtuse ; articulations two to three times their diameter : spores oblong, stalked.

241. **E. attenuata.**—Tufts minute, globose ; tubercle immersed ; filament fusiform ; lower articulations three to four times their diameter, shorter upwards ; upper about equal to the diameter ; spores obovate, sub-sessile at the base of the filaments.

242. **E. velutina.**—Tufts thin, cæspitose, spreading ; filaments minute, nearly cylindrical ; articulations rather longer than their diameter, the dissepiments slightly contracted ; spores attached near the base of the filaments by short stalks.

Gen. 95. MYRIONEMA.

243. **M. strangulans.**—Fronds minute, slightly convex, often confluent ; vertical filaments slightly clavate, obtuse ; spores obovate, tapering to the base, attached to the creeping filaments of the base.

244. **M. Lechlancherii.**—Fronds minute ; vertical filaments in the centre erect, dense, those at the margin nearly horizontal, elongate ; spores obovate, pedicellate, attached to the creeping filaments.

245. **M. punctiforme.**—Tufts globose ; filaments clavate, densely packed ; spores attached to the vertical filaments near the base, narrow obovate.

246. **M. clavatum.**—"Very minute, rather convex ; filaments greatly clavate, mostly bifid ; spores obovate, pedicellate, affixed to the (vertical) filaments."

Fam. XIX.—Sphacelarieæ.

Gen. 96. CLADOSTEPHUS.

247. **C. verticillatus.**—Much branched, mostly dichotomous ; whorls sub-distant ; ramuli mostly forked.

248. **C. spongiosus.**—Irregularly dichotomous ; branches patent ; whorls very closely approximate ; ramuli mostly simple.

Gen. 97. SPHACELARIA.

249. **S. filicina.**—Slender, irregularly and often fasciculately branched ; branches alternately bi-tri-pinnated ; pinnæ and pinnulæ rather erect.

250. **S. sertularia.**—Very slender, irregularly branched ; branches alternately bi-tri-pinnated ; pinnæ and pinnulæ very patent.

251. **S. scoparia.**—Stout, densely shaggy at the base ; irregularly branched ; branches bushy, pinnate or bi-pinnate, alternate ; pinnules subulate.

252. **S. plumosa.**—Filaments slender, irregularly branched ; branches obscurely articulate, densely pectinato-pinnate with slender, articulate, simple or pinnated ramuli.

253. **S. cirrhosa.**—Densely tufted, simple or pinnated, or here and there bi-pinnated ; pinnæ irregular ; utricles nearly sessile.

254. **S. fusca.**—Densely tufted, very slender, slightly and irregularly branched ; branches long, slender, simple, with only here and there a short, simple, or three-forked ramulus.

255. **S. radicans.**—Densely cæspitose, rooting from the base, sparingly branched; branches irregular, simple, erect; utricles clustered on the ramuli, sessile, globose.

256. **S. racemosa.**—"Spores racemose, in compound racemose, lateral clusters."

Fam. XX.—Ectocarpeæ.

Gen. 98. ECTOCARPUS.

257. **E. siliculosus.**—Densely tufted; filaments slender, capillaceous, flaccid, pale, much branched; ramuli alternate; utricles on short stalks, ovate acuminate.

258. **E. amphibius.**—"Tufts short, soft, pale olive; filaments subdichotomous; ramuli scattered, subulate; articulations twice or thrice as long as broad; propagula linear-attenuate; mostly sessile."

259. **E. fenestratus.**—Irregularly dichotomous; branches distant, slender; articulations two to three times their diameter; utricles stalked, elliptic-oblong.

260. **E. fasciculatus.**—Slightly branched; branchlets distant, patent, beset on their upper side with rather long, secund, subulate ramuli.

261. **E. Hincksiæ.**—Much branched; branches irregular, flexuous, set with secund ramuli along their upper side, which are closely pectinated on their upper side with short tooth-like obtuse utricles.

262. **E. tomentosus.**—Filaments densely interwoven into a sponge-like, branching frond; branches irregular, distant, with few scattered ramuli; utricles stalked, elliptical.

263. **E. crinitus.**—Very slender, cæspitose; branches few, distant, with very few patent, scarcely tapering, ramuli; vesicles spherical, sessile.

264. **E. pusillus.**—Densely tufted; branches few, distant, very patent, with very few divaricated ramuli; utricles roundish oblong, nearly sessile, frequently opposite.

265. **E. distortus.**—Densely matted and interwoven, much branched, and very flexuous; branches patent or reflexed; apices obtuse.

266. **E. Landsburgii.**—Densely interwoven and matted together, very flexuous; ramuli very patent or recurved and spine-like; endochrome quite filling the cell.

267. **E. littoralis.**—Elongate, densely tufted; branches alternate or opposite; utricles innate in the upper ramuli, forming cylindrical swellings.

268. **E. longifructus.**—Elongate, densely tufted and excessively branched; branches mostly opposite; ultimate ramuli short, spine-like; utricles innate, terminating the ramuli.

269. **E. granulosus.**—Tufted, but scarcely entangled; main branches irregular, ultimate branches and ramuli oppositely pinnated; utricles broadly elliptical, sessile.

270. **E. sphærophorus.**—Densely tufted, much branched; branches opposite or in fours; ramuli opposite, subpatent; utricles spherical, sessile, opposite to each other or to a branch.

271. **E. brachiatus.**—Branches opposite or in fours; ramuli opposite, subpatent; utricles immersed at the junction of the ramuli.

272. **E. Mertensii.**—Main stem percurrent; branches opposite, distant, very unequal in their length, all pectinato-pinnate, with short spine-like, opposite ramuli, in which are imbedded the binate utricles.

GEN. 99. MYRIOTRICHIA.

273. **M. clavæformis.**—Frond filiform, densely set with obtuse, somewhat clavate ramuli, those near the apex longest, giving the whole a clavate outline.

274. **M. filiformis.**—Frond filiform, often flexuous; ramuli short, equal, papillæform, interrupted at irregular intervals.

Sub-Order III.—CHLOROSPERMEÆ.

FAM. XXI.—Siphonaceæ.

GEN. 100. CODIUM.

275. **C. bursa.**—Frond spherical, hollow.

276. **C. adhærens.**—Crustaceous, velvety, spreading.

277. **C. amphibium.**—Frond composed of an indeterminal thin-spreading velvety crust, with cylindrical or obovate papillæ scattered over the surface.

278. **C. tomentosum.**—Cylindrical, repeatedly branched.

GEN. 101. BRYOPSIS.

279. **B. plumosa.**—Filiform, repeatedly pinnated upwards, naked below.

280. **B. hypnoides.**—Much and irregularly branched; branches slender, elongate.

GEN. 102. VAUCHERIA.

281. **V. submarina.**—Forms a dense velvety cushion; filaments dichotomous; spores clustered, elliptical, lateral.

282. **V. marina.**—Very sparingly branched; spores scattered, stalked, obovate.

283. **V. velutina.**—Fronds from creeping filaments, erect, forming a velvety cushion; spores globose, solitary, lateral, stalked.

FAM. XXII.—Confervaceæ.

GEN. 103. CLADOPHORA.

284. **C. Brownii.**—Densely tufted, cushion-like; filaments matted, slightly branched; articulations clavate, four to five times their diameter.

285. **C. repens.**—Forming dense velvet-like tufts, rooting below, slightly branched; branches patent; articulations cylindrical, ten to twenty times their diameter.

286. **C. pellucida.**—Rigid, tapering, branched at every joint in a repeatedly pinnated manner; articulations cylindrical, eight to twelve times longer than their diameter.

287. **C. rectangularis.**—Loosely tufted, capillaceous; branches distant, at right angles, everywhere set at every joint with short spine-like patent ramuli; articulations thrice their diameter; dissepiments constricted.

288. **C. Macallana.**—Very slender, much branched; branches alternately capillaceo-multifid, very patent or recurved, obtuse; ultimate ramuli very short, recurved; articulations two to three times their diameter.

289. **C. Hutchinsiæ.**—Rigid, capillaceous, flexuous, loosely tufted, much branched; branches subalternate, ultimate short, of one or two joints, secund on the upper edge; articulations two to three times their diameter.

290. **C. diffusa.**—Loosely tufted, much branched; branches very irregular, capillaceo-multifid, ultimate ramuli long, sub-erect, and more or less secund; articulations three to four times their diameter.

291. **C. nuda.**—Rather rigid, slender, sparingly branched; branches sub-erect, very distant, irregularly dichotomous, cylindrical or slightly inflated, with thick walls and hyaline dissepiments, five to ten times their diameter.

292. **C. rupestris.**—Harsh and rigid, much branched; branches sub-erect, mostly opposite; ramuli long, slender, opposite or alternate; articulations cylindrical, three to four times their diameter.

293. **C. lætevirens.**—Much branched; branches crowded, erecto-patent, flexuous, irregular; ultimate ramuli forked or secund, short, of one or two articulations, those in the main stems and branches six times, in the ramuli two to three times their diameter.

294. **C. flexuosa.**—Flexuous, capillaceous, much branched, repeatedly branched, irregularly dichotomous, ultimate ramuli slender, rather long, secund or alternately secund in sets, slightly curved upwards; articulations three to four times their diameter.

295. **C. gracilis.**—Very slender, flexuous, flaccid, much branched and bushy; ultimate ramuli long, slender, acuminated, slightly curved upwards; articulations three to five times their diameter.

296. **C. Balliana.**—"Filaments very long, extremely slender and soft, grass green, excessively branched; penultimate branches virgate, and set with slender, secund, short ramuli; articulations of the branches eight or ten times, of the ramuli six or eight times, as long as broad.

297. **C. Rudolphiana.**—Extremely slender, somewhat flexuous, flaccid, excessively branched; branches rather distant, patent; ultimate ramuli long and slender; articulations eight to twelve times their diameter, shorter upwards.

298. **C. refracta.**—Slender, rather rigid, much branched; branches irregular, somewhat distant below but very dense upwards, and very patent or recurved; ultimate ramuli secund, rather short; articulations two to three times their diameter.

299. **C. albida.**—Densely tufted, very flaccid and slender, excessively branched; main branches patent, more erect upwards and closer; ultimate ramuli of one or two joints, mostly secund; articulations about four to five times their diameter.

300. **C. lanosa.**—Densely tufted, short, flaccid and silky; branches few, long, slender, erect, straight, irregularly alternate; lower articulations about twice, upper four to six times their diameter.

301. **C. uncialis.**—Densely tufted, short, rather flaccid, sparingly branched; branches irregularly alternate or secund, somewhat curved upwards, erecto-patent; articulations one and a-half to two and a-half times their diameter, somewhat inflated.

302. **C. arcta.**—Densely tufted, very soft and silky when young, more rigid when old, the filaments more or less twisted and entangled; branches straight, very erect, irregularly scattered; articulations below once or twice as long as broad, in the ramuli many times longer, than their diameter.

303. **C. glaucescens.**—Densely tufted, slender and flexuous, much branched; branches erecto-patent, slender; ramuli long, slender and secund; articulations about thrice their diameter.

304. **C. falcata.**—"Densely tufted, dark green; filaments curved, rigid, irregularly divided; branches zigzag, decompound, the lesser branches arched or incurved and falcate, ramulose in their inner faces; ramuli blunt; articulations three to four times as long as broad, with a dense endochrome and pellucid dissepiments."

305. **C. Magdalenæ.**—"Filaments capillary, blackish green, short, decumbent, matted together, slightly branched, angularly bent; branches divaricate, dichotomous; ramuli few, falcate; articulations three to four times as long as broad."

306. **C. Gattyæ.**—"Filaments short, dingy green, capillary, matted together, densely tufted, dichotomous, flexuous with few ramuli; articulations once and a-half as long as broad."

307. **C. flavescens.**—Forming extensive floating strata, very slender, much branched; branches patent, irregularly dichotomous; ramuli slender, mostly secund, of two or three articulations, which are six to nine times their diameter.

308. **C. fracta.**—At length floating; branches dichotomous, rather patent, and distant; ultimate ramuli few, mostly secund, of about three joints; articulations three to six times their diameter, at length elliptical or obovate.

Gen. 104. RHIZOCLONIUM.

309. **R. riparium.**—Very slender, angularly bent, the angles furnished with root-like processes; articulations about twice their diameter.

310. **R. Casparyi.**—"Filaments extremely slender, pale, interwoven, curved and bent; angles emitting root-like branches; articulations two to six times longer than broad; endochrome granular."

Gen. 105. CONFERVA.

* *Forming free floating strata.*

311. **C. arenicola.**—Free, forming wide-spreading strata; very slender and matted; articulations once and a half their diameter.

312. **C. arenosa.**—"Filaments slender, straightish, rigid, forming wide strata; joints three to five times as long as broad."

313. **C. littorea.**—"Filaments thick, rigid, crisped, loosely bundled, dull green; articulations once and a half as long as broad, here and there swollen in pairs and discoloured."

314. **C. Linum.**—Rather stout, forming crisped and entangled strata of indefinite extent; articulations about equal to their diameter.

315. **C. sutoria.**—Very slender, forming much twisted and entangled floating strata; articulations once and a half as long as broad.

316. **C. tortuosa.**—Very slender, curled, twisted, and inextricably entangled, rigid; articulations two to three times their diameter.

317. **C. implexa.**—Very slender, slightly rigid, very much crisped and entangled; articulations a little longer than their diameter; dissepiments slightly contracted.

** *Fixed by the base.*

318. **C. melagonum.**—Very rigid, stout, erect, scarcely tufted, dark green ; articulations twice as long as their diameter.

319. **C. ærea.**—Rather slender, rigid, tufted ; articulations about equal to their diameter.

320. **C. collabens.**—"Filaments long, straight, tufted, variable in diameter, gelatinous and flaccid, æruginous green ; articulations as long as broad, with dense granular endochrome."

321. **C. bangioides.**—Rather slender and flaccid, some waved, tufted, and entangled ; articulations twice their diameter ; dissepiments at length pellucid.

322. **C. Youngana.**—Short, densely tufted, straight and rigid ; articulations about once or twice their diameter, somewhat inflated ; dissepiments at length contracted.

GEN. 106. OCHLOCHÆTE.

323. **O. Histrix.**—"Minute, creeping, pale green, hoary from its numerous rigid setæ."

FAM. XXIII.—Ulvaceæ.

GEN. 107. ENTEROMORPHA.

324. **E. cornucopiæ.**—Small, membranous, inflated, saccate, obovate ; at length open at the summit, with a short stalk.

325. **E. intestinalis.**—Simple, at length elongate, much inflated, and gradually widened from the base upwards.

326. **E. compressa.**—More or less branched, especially at the base ; branches mostly simple, gradually widening to an obtuse apex.

327. **E. Linkiana.**—Filiform, cylindrical, much branched ; branches patent, scattered, acute ; reticulations large, roundish, quadrate.

328. **E. erecta.**—Very slender, cylindrical ; branches erect, scattered, plumose, erecto-patent, attenuate ; reticulations quadrate.

329. **E. clathrata.**—"Cylindrical, filiform, slender, reticulated, much branched ; branches decompound, spreading, set with divaricating spine-like ramuli."

330. **E. ramulosa.**—Very slender, irregularly branched ; branches short, everywhere set with short divaricated spine-like ramuli.

331. **E. Hopkirkii.**—"Frond byssoid, excessively branched ; branches erect, attenuate, bearing scattered, subulate ramuli ; reticulations very large, each areole containing one or two minute grains."

332. **E. percursa.**—"Capillary, entangled, simple, compressed, subsolid, reticulated ; cells quadrate, two or more in the breadth of the frond ; endochrome filling the cell."

333. **E. Ralfsii.**—"Capillary, simple, or nearly so, subsolid, largely reticulated ; areoles large, hyaline, two to four in the breadth of the frond, each containing a bright green grain of endochrome."

GEN. 108. ULVA.

334. **U. latissima.**—Ovate, oblong, obovate or roundish and irregular, rigid, membranous.

335. **U. Lactuca.**—Delicately membranous, obovate, inflated, saccate, closed, at length bursting at the top, and becoming torn, often to the base, into numerous laciniæ.

336. **U. Linza.**—Flat, linear-lanceolate, margins much waved, tapering at the base into a flattened footstalk.

GEN. 109. PORPHYRA.

337. **P. laciniata.**—Flat, thin, membranous, irregularly cleft and laciniated.

338. **P. vulgaris.**—Simple, lanceolate, the margin much waved and entire.

GEN. 110. BANGIA.

339. **B. fusco-purpurea.**—Filiform, cylindrical, simple, here and there imperfectly constricted, dark purple; granules large, forming transverse bands.

340. **B. ciliaris.**—Very minute, compressed, tapering to each end, or of irregular breadth; granules large, bright purple, two to three in each transverse series.

341. **B. ceramicola.**—Minute, very slender and flaccid, articulated; articulations nearly twice their diameter, "longitudinally striate."

342. **B. elegans.**—Filaments minute, dichotomously branched, with very patent axils; branches containing a single row of simple or binate, purple, granular cells.

FAM. XXIV.—Oscillatoriaceæ.

GEN. 111. RIVULARIA.

343. **R. plicata.**—Roundish or irregularly lobed, often compressed, wrinkled or plaited, solid or hollow in age, torn and distorted; filaments united dichotomously, tapering upwards to a fine point.

344. **R. atra.**—Minute, globose or hemispherical, hard, and glossy; filaments irregularly dichotomous.

345. **R. nitida.**—Rather large, roundish or more or less lobed irregularly; filaments much attenuated, scarcely united.

GEN. 112. SCHIZOSIPHON.

346. **S. Warreniæ.**—Forming a firm crust more or less covered on the surface with little tubercles, composed of erect sheathed filaments, gradually tapering to an acute point, the basal joint obtusely conical; the sheaths split at the top into innumerable capillaceous segments, united in pinnated series.

GEN. 113. SCHIZOTHRIX.

347. **S. Creswellii.**—Forming convex tufts or patches; "filaments very slender, curved, fastigiate, collected into branching bundles.'

GEN. 114. CALOTHRIX.

348. **C. confervicola.**—Minute, tufted, cylindrical, of equal diameter throughout, slightly curved, rigid.

349. **C. luteola.**—Scattered, very minute, flaccid, pale yellowish green; endochrome interrupted, very indistinctly annulated.

350. **C. fasciculata.**—Forming a dark green velvety stratum; filaments straight, subulate, simple or fasciculately branched upwards.

351. **C. scopulorum.**—Forming a dense velvety stratum, brownish green; filaments simple, much contorted and interwoven, cylindrical, attenuated upwards to an obtuse point.

352. **C. pannosa.**—Forming dense "lamellated tufts or honey-combed strata; filaments rigid, much contorted and twisted, of equal diameter throughout; apices obtuse.

353. **C. semiplena.**—Forming dense strata; filaments simple, slender, flexuous, of equal diameter throughout; apices obtuse; endochrome often interrupted, not very distinctly annulated.

354. **C. hydnoides.**—Filaments assurgent, rising into irregular tooth-like fascicles over the surface of the stratum; endochrome distinctly annulated, spuriously branched or cohering in consecutive series.

355. **C. cæspitula.**—Forming small, convex, dense tufts; filaments flaccid, obtuse, not attenuated, here and there spuriously branched; border of the filament narrow (*Harvey*).

Gen. 115. LYNGBYA.

* *Tube continuous; endochrome cylindrical, imperfectly annulated.*

356. **L. majuscula.**—Forming wide spreading strata, blackish green; filaments rather stout, much twisted; endochrome densely annulated.

357. **L. ferruginea.**—Forming wide strata of a verdigris-green colour; filaments very slender, rather flaccid, frequently changing to brownish when dry.

** *Tube imperfectly articulated; endochrome distinctly annulated, with pellucid interspaces.*

358. **L. Carmichaelii.**—Filaments rather stout, curled, and interwoven.

359. **L. speciosa.**—"Filaments very long, thick, flaccid, straight, at length curled, the margin slightly crenate, yellow-green, glossy when dry."

360. **L. flacca.**—Short tufts, filaments straight, occasionally with short proliferous processes, articulated; articulations shorter than their diameter; endochrome at length much contracted into minute roundish globules.

361. **L. Cutleriæ.**—"Exceedingly slender, soft, articulated; articulations as long as broad; the endochrome at length spherical."

Gen. 116. MICROCOLEUS.

362. **M. anguiformis.**—Sheaths minute, decumbent, gradually tapering to a point at one end, open at the other; filaments straight, oscillating from the open end, or from an accidental rupture.

Gen. 117. OSCILLATORIA.

363. **O. littoralis.**—Forming indefinite strata of a dark but bright green colour, rather stout, somewhat curved, strongly striated rather distantly.

364. **O. spiralis.**—Stratum rather thick, very dark green; filaments slender, spirally twisted and interwoven.

365. **O. nigro-viridis.**—Stratum thick, dark green; filaments rather rigid, with very obtuse curved apices; striæ distant, fully half the diameter.

366. **O. subuliformis.**—Stratum very dark green; filaments slender, curved and pointed at one end; striæ not very distinct; distance nearly equal to the diameter.

367. **O. insignis.**—"Stratum of a dark brown, almost black colour; filaments brown, very thick, their apices obtuse, slightly oblique and ciliated; striæ very close."

Gen. 118. SPIRULINA.

368. **S. tenuissima.**—Forming very lubricous strata, dark green; filaments slender and flexuous, formed into a close spiral.

Fam. XXV.—Nostochaceæ.

Gen. 119. MONORMIA.

369. **M. intricata.**—Frond extremely gelatinous, branched, very soft and lubricous; moniliform filament very long and much convoluted.

Gen. 120. SPHÆROZYGA.

370. **S. Carmichaelii.**—"Spores oblong, twice or thrice as long as broad, next the connecting cell."

371. **S. Thwaitesii.**—Spores elliptical, one and a half times the diameter, those most distant from the "connecting cell" first formed.

372. **S. Broomei.**—"Spores numerous, elliptical, twice as long as wide; commencing nearest the connecting cells, which are smooth and subquadrate."

373. **S. Berkeleyana.**—Spores large, twice the width of ordinary cells, oblong, half as long again as wide, brown when mature; two on each side of the connecting cell, which is sphæroidal.

Gen. 121. SPERMOSIRA.

374. **S. littorea.**—Stratum very dark green; filaments rather stout; cells transversely compressed, elliptical, not wider than the cell.

375. **S. Harveyana.**—"Filaments much curved, composed of cells nearly as long as broad; spores exactly spherical, almost twice the diameter of the cells; connecting cells subquadrate, rather longer than wide, and of the same width as the ordinary cells."

Fam. XXV.—Palmellaceæ.

Gen. 122. HORMOSPORA.

376. **H. ramosa.**—Filaments minute, irregularly dichotomous; "endochrome radiating."

SUMMARY.

Sub-Order.	Families.	Genera.	Species.	Nature-prints.	Engraved Dissections.
Rhodosperms . .	13	66	179	139	49
Melanosperms . .	6	34	95	54	42
Chlorosperms . .	6	22	102	24	78
Total	25	122	376	217	169

BIBLIOGRAPHY.

Acharius, E., de Echinella radiosa (*Weber, Beitr.* ii. 310).

Adanson, M., Mémoire sur un Mouvement découvert dans une Plante, appellé Tremelle (*Hist. de l'Academ. des Sc.* 1767, p. 564, 55).—Familles de Plantes. Paris, 1763. 8vo.

Agardh, C. A., Dispositio Algarum Sueciae. Lund. 1810–1812. 4to.—Algarum Decades, 1–4. Lund. 1812. 4to.—Synopsis Algarum Scandinaviæ, adjecta Dispositione universali Algarum. Lund. 1817. 8vo.—Dissertatio de Metamorphosi Algarum. Lund. 1820. 8vo (*Vers. Germ. in Flora*, 1823, 1 Beilag. p. 17, ss.).—Icones Algarum ineditæ, Fasc. 1, 2. Lund. 1820–1822. 4to.—Species Algarum rite Cognitæ. Gryphiswaldiæ, 1821. 8vo, vol. i.; Gryphisw. 1828, vol. ii.—Systema Algarum. Lund. 1824. 8vo.—Ueber den in der Polarzone gefundenen rothen Schnee (*Nov. A. N. C.* 1826, xii. 2, pp. 735–750).—Ueber die Anatomie und den Kreislauf der Charen (*Nov. A. N. C.* 1826, xiii. 1, pp. 113–162, t. 10).—Observations sur le Genre Chara (*Annal. Sc. Nat.* 1828, iv. pp. 61–66).—Aufzählung einiger in den österreichischen Ländern aufgefundener neuer Gattungen und Arten von Algen, nebst ihrer Diagnostik und beigefugten Bemerkungen (*Flora*, 1827, ii. pp. 625–646, et seorsim).—Icones Algarum Europæarum. Lipsiæ, 1828–1829. 8vo. Fasc. 1–3, c. tabb. 30.—Beobachtungen über crystallinische Bildungen in Algen (*Flora*, 1828, ii. pp. 583–586).—Ueber die gegen meine Ansicht in der Physiologie der Algen gemachten Einwürfe (*Nov. A. N. C.* 1829, xiv. 2, pp. 732–768, t. 42).—Einige Bemerkungen über Dr. Meyens kritische Beiträge zum Studium der Süsswasseralgen (*Flora*, 1829, i. pp. 193–206, u. 209–219).—Conspectus criticus Diatomacearum. Lund. 1830–1832. 8vo, 66 pag.—Revision der Algengattung Macrocystis (*Nov. A. N. C.* 1839, xix. pp. 281–316, t. 25–28).

Agardh, J. G., Om Hafs Algers germination. Stockholm, 1834. 8vo, c. tabb. 2 (*Germ. in Linnæa*, 1835, v. pp. 449–459; *Gall. in Nouv. Annal. Sc. Nat.* 1836, vi. pp. 193–212).—Novitiæ Floræ Suecicæ ex Algarum familia, quas in itineribus ad oras occidentales Sueciae annis 1832–1835 collegit. Lund. 1836. 8vo. 16 pag.—Novæ Species Algarum, quas in itinere ad oras Mari Rubris cellegit Ed. Rüppel, cum observationibus nonnullis in Species rariores antea cognitas (*Mus. Senkenberg.* ii. pp. 169–174).—Ag. und Liebmann, Ueber die Wachsthumsart der Laminaria digitata (*Flora*, 1841, pp. 195, 196).—In Historiam Algarum Symbolæ (*Linnæa*, 1841, xv. pp. 1–50). Continuatio I. (*Ibid.* xv. pp. 443–457).—Algæ Maris Mediterranei et Adriatici. Parisiis, 1842. 8vo.—In systemata Algarum hodierna Adversaria. Lundæ, 1844. 8vo.—Species Genera et Ordines Algarum. 5 pts. Lundæ, 1848–1852. 8vo.

Algues de la Normandie, recueillies et publiées, la partie des Articulées par M. Roberge; et la partie des Inarticulées par M. Chauvin. Caen, 1827. Fol.

Amici, Osservazioni microscopiche sopra varie Piante (*Atti delle Soc. Ital. delle Scienze*, publ. a Modena, 1823, xix.; *Annal. Sc. Nat.* 1824, ii. 41–70, 211–248).—Descrizione di mi Oscillaria. Firenze, 1833. 8vo.

Andrejewskyi, D., Ueber die Vegetation in den Bädern von Abano (*Journ. für Chirurgie und Augenkrankheiten*, von Græfe und Walther, 1831; *Nouv. Annal. Sc. Nat.* 1835, iii. p. 189).

Areschoug, J., De Hydrodictyo utriculator Dissertatio. Lund. 1838. 8vo.—Ueber die Vermehrungsart des Wassernetzes (*Linnæa*, 1842, xvi. pp. 127–134, c. ic.).—Algarum minus rite cognitarum Pugillus, 1 (*Linnæa*, 1842, xvi. pp. 225–236, c. ic.).—Symbolæ Algarum rariorum Floræ Scandinavicæ. Lundæ, 1838. 8vo.

Bailey. American Bacillaria (*Amer. Journ. of Sc. and Arts*, vol. xli. et xlii.)

Barreliere, J., Icones Plantarum per Galliam, Hispaniam et Italiam Observatarum. Opus posthumum, editum cura et studio A. de Jussieu. Parisiis, 1714. Fol.

Bartholinus, Th., Acta medico-philosophica Hafniensia Hafniæ, 1673–1677. 4to, 4 vols.

Baster, J., Opuscula subseciva, Observationes miscellaneas de Animalculis et Plantis quibusdam marinis continentia. Harlemi, 1762–1765. 4to, vols. i.–xii.

Bauer, Ferd., On the Uredo nivalis (*Journ. of Sc. and Arts*, vii. p. 222).

Bauhin, C., Pinax Theatri Botanici. Basileæ, 1623. 4to.

Bauhin, J., Historia Plantarum Universalis. Ebrodun. 1650. Fol. 3 vols.

Beauvais, Palisot de, Flore d'Oware et de Benin. Paris, 1805. Fol.

Becquerel, Influence de l'Electricité sur la Circulation du Chara (*Compt. Rend. Academ. Sc.* 1837, p. 784).

Beggiato, J., Memoria delle terme Euganee. Padova, 1833. 8vo.

Bemerkungen, einige, über den jetzigen Zustand der Algologie (*Flora*, 1826, i. 133 ; ii. 555).

Berkeley, J., Gleanings of British Algæ, being an Appendix to the Supplement to English Botany. London, 1833–35. 8vo. —On the supposed Animal Nature of the Seeds of certain Algæ (*Hooker, Journ. of Bot.* 1834, i. pp. 233, 234).—On Gloionema paradoxum (*Annal of Nat. Hist.* 1841, vii. pp. 449–451).—Cryptogamic Botany. London, 1857. 8vo.

Bertoloni, A., Sopra una nuova Specie di Chara (*Configl. et Brugnatelli Giornale di Fisic. etc.* Pavia, 1826, ix. p. 206 ; *Gallice in Annal. Soc. Linn. Paris*, 1827, v. pp. 325–327).—Memoria sopra alcune produzioni del Golfo della Spezia (*Atti della Soc. Ital. resid. in Modena*, 1832). —Rariorum Italiæ Plantarum Decades (*Amoen. Ital. Bonon.* 1839, pp. 61–102). —Historia Fucorum Maris Ligustici (*Ibid.* pp. 280–317).

Biasoletto, B., Di alcune Alghe microscopiche. Trieste, 1832. 8vo.—Ueber die Gattung Codium (*Bericht über die Versammlung der Naturforscher zu Breslau*, 1833. *Isis*, 1834, pp. 650–653).—Ueber die Metamorphose der Algen (*Flora*, 1838, ii. pp. 409–414).—Dasya Kützingiana (*Linn.* 1837, p. 477, tabb. 8, 9).—B. et Tommasini, *Vide* Tommasini.

Bischoff, G. W., De Plantarum, præsertim Cryptogamicarum transitu et analogia. Heidelb. 1825. 8vo.—Die kryptogamischen Gewächse mit besonderer Berücksichtigung der Flora Deutschlands. Nürub. 1828. 4to. Lief. 1, 2.

Bivona-Bernardi. Scinaia, Algarum marinarum novum genus. Palermo, 1822. 8vo.

Blumenbach, Ueber eine ungemein einfache Fortpflanzungsweise (*Götting. Magaz.* 1781, ii. 1, 80).

Boccone, Museo di Fisica. Venezia, 1697. 4to.

Bonnemaison, M. T., Essai d'une Classification des Hydrophytes loculées (*Journ. Phys.* 1822, xciv. pp. 174–203).—Essai sur les Hydrophytes loculées de la Famille des Epidermiées et des Ceramiées (*Mém. Mus.* 1828, xvi. pp. 49–148, t. 3–8).

Borrichius, Olaus, De Alga saccharifera corollarium (*Bartholini Act. Med. et Phil. Hafn.* i. 119 ; iv. 159).—Plantæ in Planis silicibus enatæ (*Ibid* i. 118).

Bory de St. Vincent. Mémoire sur les Genres Byssus et Conferva. Bordeaux, 1797. 8vo.—Essai sur les Isles Fortunées et l'antique Atlantide. Paris, 1802. 4to.—Voyage dans les quatre principales Isles de Mers d'Afrique. Paris, 1802. 4to.—Mémoire sur un Genre nouveau de la Cryptogamie aquatique nommé Thorea. (*Annal. du Mus.* 1808, xii. p. 226).—Mémoire sur le Genre Lamanea (*Annal. Mus.* 1808, xii. 177 ; *Berl. Magaz.* 1809, p. 274).—Mémoire sur le Genre Batrachospermia (*Annal. Mus.* 1808, xii. p. 310).—Mémoire sur le Genre Draparnaldia (*Annal. Mus.* 1808, xii. 399).—Varia in Dict. Class. d'Hist. Nat. sub vocibus : Achnantes, 1, 79.—Acinaria, 1, 93.—Amasperma, 1, 249.—Ampoules, 1, 301.—Anabaine, 1, 307.—Arthrodie, 1, 591.—Arthrodiées, 1, 591. —Antacide, 2, 93.—Baccifer, 2, 126.—Batrachosperme, 2, 226.—Boryne, 2, 412.—Botrytelle, 2, 424.—Brongniartelle, 2, 216.—Bulbochæte, 2, 565.—Cahodinées, 3, 12.—Cahos, 3, 15.—Callithamnie, 3, 59.—Capsicarpellés, 3, 178.—Céraminaires, 3, 339.—Céramie, 3, 342.—Céramopse, 3, 743.—Chætophore, 3, 431.—Champia, 3, 459.—Chantransie, 3, 470.—Cladostephus, 4, 182.—Cluzelle, 4, 234.—Codium, 4, 281.—Conferve, 4, 389.—Confervées, 4, 392.—Cystoseira, 5, 298.—Deliselle, 5, 389.—Demarestelle, 5, 438.—Diatome, 5, 461.—Dicarpelle, 5, 464.—Dictileme, 2, 481.—Draparnaldia, 5, 614.—Ectocarpe, 6, 63.—Ectosperme, 6, 63.—Episperma, 6, 231.—Erinacée, 6, 258.—Fucoides, 7, 72.—Gaillonelle, 7, 101.—Géographie, 7, 239.—Gloionema, 7, 378. —Gonycladon, 7, 433.—Grateloupia, 7, 481.—Helierelle, 8, 98.—Heterocarpelle, 8, 180.—Hutchinsie, 8, 396.—Hydroclathre, 8, 419.—Hydrodictye, 8, 422.—Hydrogastre, 8, 423.—Hydrophytes, 8, 435.—Hydrurus, 8, 442.—

Hygrocrocis, 8, 447.—Iridée, 9, 15.—Laminaire, 9, 187.—Laminariées, 9, 191.—Lamourouxelle, 9, 194.—Lamourouxia, 9, 194.—Lemanée, 9, 274.—Leptomitus, 9, 307.—Lessonie, 9, 321.—Lichina, 9, 369.—Linckia, 9, 434.—Lomation, 9, 487.—Lomentaire, 9, 489.—Lorée, 9, 503.—Loricaire, 9, 505.—Lyngbya, 9, 576.—Lyngbyelle, 9, 576.—Macrocyste, 10, 8.—Mer. 10, 370.—Meridion, 10, 425.—Merizomyria, 10, 428.—Microcoleus, 10, 524.—Moniliformie, 11, 86.—Moniline, 11, 86.—Mougestia, 11, 241.—Mycoderme, 11, 348.—Myriodactylon, 11, 384.—Navicule, 11, 472.—Nématoplate, 11, 498.—Némazoaires, 11, 501.—Nodulaire, 11, 584.—Nostoc, 11, 596.—Odonthalia, 12, 62.—Oedogonium, 12, 78.—Orgyia, 12, 353.—Orimanthis, 12, 355.—Oscillaire, 12, 457.—Oscillariées, 12, 480.—Oscillatoire, 12, 483.—Oscillatorinées, 12.—Osmondaria, 12, 490.—Padine, 12, 589.—Palmaria, 12, 619.—Palmelle, 12, 620.—Percursaire, 13, 206.—Percussarie, 13, 206.—Pexisperma, 13, 314—Phoracis, 13, 426.—Physidrum, 13, 471.—Physostris, 13, 474.—Pilayelle, 13, 565.—Polyphyse, 14, 184.—Prolifére, 14, 292.—Protococcus, 14, 307.—Ptilota, 14, 853.—Pussilline, 14, 373.—Pygmea, 14, 378.—Reticuline, 14, 540.—Rhodoméne, 14, 575.—Rivulaire, 14, 623.—Rivulinées, 14, 623.—Rytiphlæa, 15, 28.—Schizonema, 14, 241.—Scorpioides, 15, 283.—Scorpiura, 15, 289.—Scytonème, 15, 313.—Scytosiphon, 15, 313.—Siliquaire, 15, 430.—Solenie, 15, 488.—Sphacelaria, 15, 537.—Sphærococcus, 15, 541.—Sphæroplea, 15, 543.—Spirogyra, 15, 579.—Spongodium, 15, 590.—Sporochnus, 15, 592.—Stackhousia, 15, 612.—Stigonema, 15, 653.—Stylobasis, 15, 696.—Stypnion, 15, 699.—Ulvacées, 16, 459.—Ulve, 16, 460.—Valonie, 16, 498.—Varec, 16, 509.—Vaucherie, 16, 514.—Zonaria, 16, 723.—Zoocarpées, 16, 724.—Zygnema, 16, 746.—Hydrophytologie de la Coquille. Paris, 1826. 4to. (*Voyage autour du Monde, par Duperrey. Partie Botanique. Agamie.* Paris, 1826. 4to, c. tabb. in folio).—Belanger, Voyage aux Indes orientales. Botanique Cryptogamie. Paris, 1836. 8vo. Atl. in 4to.—Nouvelle Flore du Peloponese. Paris, 1836, fol. (*Expedit. scientif. en Morée*, tom. iii. p. 11; *Botanique, Hydrophytes*, pp. 317–337).

Bosc, Description d'une Espèce de Conferve (*Bullet. Philomat.* i. 145).

Boubée-nérée, Nouveaux Gisemens en France de Botanique (*Bulletin d'Histoire Nat. de France, Insunt Observ. de Zygnemate exili Delast. et de Ceramio pictaviensi Delast.*).

Braun, Alex., Esquisse monographique du Genre Chara (*Annal. Sc. Nat.* 1834, i. pp. 349–357).

Brebisson, de, Observations sur les Diatomées (*Nouv. Annal. Sc. Nat.* 1836, vi. pp. 248–251).—Varia in *d'Orbigny Dict. Univ. d'Hist. Nat.* sub vocibus: Ægira, 1, 142.—Agmenellum, 1, 198,—Anabaina, 1, 409.—Arthrodesmia, 2, 173.—Arthrodie, 2, 174.—Arthrodiées. 2, 174.—Arthrotoma, 2, 177.—Batrachosperme, 2, 502.—Batrachospermeæ, 2, 502.—Batrachospermella, 2, 502.—Berkeleya, 2, 549.—Bichatia, 2, 565.—Biddulphia, 2, 566.—Binatelle, 2, 576.—Brachysira, 2, 714.

Brongniart, A., Observations sur les Fucoides et quelques autres Plantes marines fossiles (*Mem. Soc. H. N.* Paris, 1823, i. 301).—Prodrome d'une Histoire des Végétaux fossiles. Paris, 1828. 8vo.—Histoire des Végétaux fossiles. Paris, 1828. 4to, t. i.—Varia in *Dict. Class. d'Hist. Nat.* sub vocibus: Characées, 3, 474.—Charagne, 3, 475.—Cryptogamie, 5, 155.—Tetraspora, 16, 196.—Thamnophora, 16, 208.—Thaumasia, 16, 210.—Trentepholia, 16, 343.—Undina, 16, 461.—Végétaux fossiles, 16, 531.—Rapport sur un Mémoire du Doct. Montagne sur l'Organisation des Caulerpées (*Compt. Rend. Acad. Sc.* 1838, i. 269).

Brown, Sam., On the Mucilage of the Fuci, with Remarks on its Application to Economical ends (*Edinb. New Philosoph. Journ.* 1839, xxvi. pp. 409–414).

Bruckmann, F. E., De Lapide violaceo Sylvæ Hercynæ. Guelpherbyti, 1725. 4to.

Bruzelius, Arv., Observations in Genus Charæ. Lund. 1824. 8vo.

Buchner, J. A., Ueber die chemische Beschaffenheit der Chara hispida u. vulgaris (*Nov. A. N. C.* 1818, ix. pp. 349–376).

Bulletin des Sciences, par la Société Philomatique. Paris, 1799, seq. 4to.

Buxbaum, I. C., Plantarum minus cognitarum Centuriæ. Petrop. 1728. 4to.

Cagniard-Latour. Mémoire sur un Végétal confervoide d'une nouvelle Espèce (*Nouv. Annal. Sc. Nat.* 1835, iv. pp. 32–35).

Carpenter On the Microscope. London, 1857. 12mo.

Carradori. Della transformazione del Nostoc in Tremella verrucosa, etc. In Prato. 1797. 12mo.

Carus, C. G., Beitrag zur Geschichte der unter Wasser an verschiedenen Thierkörpern sich erzeugenden Schimmel- oder Algengattungen (*Nov. A. N. C.* 1823, xi. 2, pp. 491–522).

Cassini, H., Doutes sur l'Origine et la Nature du Nostoc (*Bullet. Philomat.* 1817, p. 81; *Opusc. phytolog.* ii. 2).

Chauvin, I., Observations microscopiques sur la Conferva zonata (*Mem. Soc. Linn. de le Normandie*, 1826, i. pp. 275–287).—Observations microscopiques sur le Mode de Production de la Conferva rivularis (*Congr. scientif. de France*, 1 *Sess. tenue à Caen.* 1833, pp. 49–52). Examen comparatif des Hydrophytes non articulées de la France et de l'Angleterre (*Ibid.* pp. 33–35).—Algues de la Normandie.—Recherches sur l'Organisation, la Fructification et la Classification des Algues. Caen, 1842. 4to. *Vide* Algues.

Chiaje, S. Delle, Hydrophytologiæ Regni Neapolitani Icones. Neap. 1829, fol. 16 pag. et tabb. 50.

Clausön, P., Norriges oc omliggende Öers sandfœrdigi Bescriffbelse. Kiöbenh. 1632. 4to.

Clemente, I. R., Essai sur les Variétés de la Vigne, qui végétent en Andalousie, trad. de l'Espagnol par Chaumel. Paris, 1804. 8vo. (*Accedit Appendix de Algis Hispanicis.*)

Clusius, Car., Rariorum Plantarum Historia. Antwerp, 1601. fol.

Cocks, Dr., Sea-Weed Collectors' Guide. London, 1853. 12mo.

Collomb, Observations sur quelques Phénomènes particuliers à une Matière verte (*Journ. de Physique*, 1791, xxxix. p. 169).

Comelli, F., Intorno alle Alghe microscopiche dell Dott. B. Biasoletto. Udine, 1833. 8vo.—Intorno alle Alghe dell' Acqua dolce. Udine, 1835. 8vo.

Corda, E. I. C., Essai sur les Oscillatoires des Thermes de Carlsbad (*De Carro, Almanach de Carlsbad.* Prague, 1836. 12mo).—Die Algen Deutschlands (Sturm, Deutschl. Flora, 1829–32, Heft, 18–21).

Corradori, G., Memoria sopra il Nostoch (*Opuscoli Scelti*, xvii. 36).—Della Transformatione del Nostoc in Tremella verrucosa. Prato, 1797. 8vo.

Correa, de Serra I., On the Fructification of the submerged Algæ (*Philosoph. Transact.* 1796, 494, *Schrad. Journ.* 1801, ii. p. 465).

Corti, B., Osservazioni microsopiche sulla Tremella. Lucca, 1774. 8vo.

Crome, Ueber den Torf, und über die Gewächse denen er seine Entstehung verdankt (*Hermstaedt Archiv. der Agricultur-Chemie.* Berl. 1810, iv. p. 258).

Crouan Frères, Essai d'Études sur un Hydrophyte de la Famille des Céramiées (*Archiv. de Botanique*, 1833, ii. pp. 393–397).—Sur le Padina reptans (*Ibid.* ii. p. 398).—Observations microscopiques sur le Ceramium Boucheri, Dub. et sur les Galliones de Bonnemaison (*Ibid.* 1835, iii. p. 181).—Observations microscopiques sur la Dissemination et la Germination des Ectocarpées et sur la Conferva scutulata, Engl. Bot. (*Nouv. Annal. Sc. Nat.* 1839, xii. pp. 248–251).

Debes, L., Færoæ et Færoa reserata. Kiobenh. 1673. 8vo.

De Brébisson et Godey. Algues des Environs de Falaise. Falaise, 1835. 8vo.—Considérations sur les Diatomées. Falaise, 1838. 8vo.

Decaisne, I., Florula Sinaica (*Nouv. Annal. Sc. Nat.* 1834, ii. pp. 5–18, 239–270).—Note sur le Genre Amansia (*Ibid.* 1839, xi. pp. 373–376).—Plantes de l'Arabie heureuse, recueillies par M. Botta (*Archives de Mus. d'Hist. Nat.* 1841, ii. pp. 89–199, c. icc.).—Essai sur une Classification des Algues et de Polypiers calcifères de Lamouroux (*Nouv. Annal. Sc. Nat.* 1842, xvii. pp. 297–380).—Mémoire sur les Corallines ou Polypiers calcifères (*Ibid.* 1842, xviii. pp. 97–128).

Decandolle, Aug. Pyr., Flore Française. Paris, 1805. ss. 8vo. 6 Vols.—Synopsis Plantarum in Flora Gallica Descriptarum. Paris, 1806. 8vo.—Observations sur les Plantes marines (*Bullet. soc. Philomat.* 1, 171).—Extrait d'un Rapport sur les Conferves. (*Ibid* iii. 17).—Note sur la Mousse de Corse. (*Ibid.* iii. 263).—Notice sur la Matière qui a coloré en rouge le Lac de Morat, au printemps de 1825 (*Mém. Soc. Phys. et Hist. Nat. de Genève*, 1825, iii. 2, pp. 29–42, c. ic.).

De la Pylaie. Flore de l'Ile de Terre Neuve. Paris, 1829. 4to.

Delastre, Aperçu statistique de la végétation du Département de la Vienne (*Congrès scientif. de France, sess. tenue à Poitiers*, 1834. Sept. pp. 509–522).

Delle Chiaje. Hydrophytologiæ regni Neapolitani icones. Neapoli, 1829. Fol.

De Notaris. Algologiæ maris ligustici specimen. Taurini, 1842. 4to.

Deschaleris, L. et Chereau, A., Essai sur les Cryptogames utiles (*Journ. de Pharmac.* 1825, xi. pp. 40–52).

Desfontaines, R., Flora Atlantica Parisiis, an. rep. vi. 4to. 2 vols.

Desmazieres, I. B. H. I., Lettre sur l'Animalité de quelques Hydrophytes et des Mycodermes en particulier (*Annal. Sc. Nat.* 1828, xv. pp. 206–216).—Plantes Cryptogames du Nord de la France. Lille, 1826. ss. 4to. 4 Fasc.—Notice sur quelques Cryptogames nouvelles (*Nouv. Annal. Sc. Nat.* 1836, vi. pp. 242–247).—Neuvième Notice sur quelques Cryptogames (*Ibid.* 1842, xvii. pp. 91–128).—Mémoire sur l'Ulva granulata, L. (*Annal. Sc. Nat.* 1831, xxii. pp. 193–221. c. ic.)

Despreaux, J. M., Essai sur les Laminaires des Côtes de Normandie (*Mém.*

Soc. H. N. Paris., 1834, v. pp. 40–60, t. 4–10).

Dillenius, J. J., Historia Muscorum. Oxonii, 4to.

Dillwyn, L. W., Synopsis of the British Confervæ. Lond. 1802–1814. 4to.—British Confervæ, or coloured Figures and Descriptions of the British Plants referred by Botanists to the Genus Conferva. London (*Vers. germ. Vid. Weber et Mohr*).

Dixon, W. A., A Letter concerning some Vegetable Balls (Conferva ægagropila); with remarks on them by William Watson (*Philosoph. Transact.* xlvii. p. 498).

Dodonæus, R., Stirpium Historiæ Pemptades, 6. Antwerpiæ, 1585. fol.

Donati, W., Saggio della Storia naturale marina dell' Adriatico. Venezia, 1750. 4to.

Donné, Note sur la Circulation du Chara (*Nouv. Annal. Sc. Nat.* 1838, x. pp. 346–348).

Draparnaud, J. P. R., Discours sur les Mœurs des Plantes. Montpellier, 1801. 8vo.

Drummond, J. L., On a new Oscillatoria, the colouring substance of Glaslough Lake, Ireland (*Annal. of Nat. Hist.* 1838. i. 1–6).

Duby, Mémoire sur le Groupe des Céramiées (*Mém. Soc. Phys. Génev.* 1832, v. p. 311). — Second Mémoire sur les Céramiées (*Mém. Soc. Phys. Génev.* vi. 1; *Nouv. Annal. Sc. Nat.* 1834, pp. 282–289).—Troisième Mémoire sur le Groupe des Céramiées (*Mém. Soc. Phys. Génèv.* viii. 27; *Nouv. Annal. Sc. Nat.* 1838, ix. pp. 189–192). — Botanicon Gallicum. Paris, 1830. Pars ii. 8vo.

Ducleauzeau, Essai sur l'Histoire naturelle des Conferves des Environs de Montpellier. Montpell. 1805. 4to.

Dujardin, Thèse sur quelques Végétaux inférieures. Paris, 1838. — Varia in *d'Orbigny Dict. Univ. d'Hist. Nat.* sub. vocibus: Acetabularieæ, 1, 68—Acetabule, 1, 68.—Achnanthes 1, 73.—Alcyonidium, 1, 274.—Anadyomene, 1, 418.

Dunal, F., Mémoire sur les Algues qui colorent en rouge certaines Eaux des Marais salans Mediterranées (*Nouv. Annal. Sc. Nat.* 1838, ix. pp. 172–175).

Dutrochet, Observations sur la Chara flexilis. (*Compt. Rend. Academ. Sc.* 1837. *Decemb.* pp. 775–778).—Observations sur la Circulation des Fluides chez la Chara fragilis (*Nouv. Annal. Sc. Nat.* 1838, x. pp. 5–38; 65–87).—Rapport sur un Mémoire de M. Donné relatif à certains Phénomènes de Mouvement observés chez la Chara hispida (*Nouv. Annal. Sc. Nat.* 1838, x. pp. 345–349).

Ehrenberg, Ueber das im Jahre 1686 in Curland vom Himmel gefallene Meteorpapier (*Flora* 1839, ii. pp. 463, 464). —Ueber den rothen Schnee (*Flora*, 1839, ii. pp. 703, 704).

Ehrhart, F., Plantæ Cryptogamæ (exsiccatæ). Hanov. 1785–93. fol. Dec. 1–33.

Ellis, J., Natural History of Corallines. London, 1755. 4to.

English Botany, *Vide* Smith.

Esper, E. J. C., Icones Fucorum. Abbildungen der Tange. Nürnb. 1797. ss. 4to. 1808.

Eysenhardt, C. W., Observationes in Structuram Algarum (*Linnæa*, 1828, iii. pp. 174–193).—Beobachtungen an Fucus vesiculosus (*Ibid.* 1828, iii. pp. 279–303).

Fleury, F., Étude sur les Hydrophytes non articulées (*Lycée Armoricain*, 1828; *Juin*, xi. p. 345).

Flora Danica, Icones Plantarum sponte nascentium in regnis Daniæ et Norvegiæ, editæ ab Oedero, Müller, Vahl et Hornemann. Hafn. 1761–1829. Fol. Fasc. 1–31.

Fontana, F., Sur le Tremella (*Journ. Phys.* 1776, vii. 47).

Forskal, P., Flora Ægyptiaco-arabica. Hafniæ, 1770. 4to.

Fougeroux, A. D., Sur le Varech (*Mém. Academ. Sc.* 1772, ii. p. 55).

Fries, E., Systema Orbis Vegetabilis. Plantæ Homonemæ. Lund., 1825. 8vo.

Fürnrohr, A. E., Uebersicht und kritische Bemerkungen über die Arten der Gattung Chara (*Flora*, 1826, ii. pp. 481–494).—Bauer's Sammlung von Charen (*Flora*, 1831, pp. 339–343).

Gaillon, B., Essai sur l'Étude des Thalassiophytes. Rouen, 1820. 8vo. — Aperçu microscopique et physiologique de la Fructification des Thalassiophytes symphytisées (*Annal. Gen. Sc. Phys.* 1821, viii. 8vo. pp. 352–372). — Experiences microscopiques et physiologiques sur une Espèce de Conferve marine, Production animalisée, etc. Rouen, 1823. 8vo.—Observations microscopiques sur le Conferva comoides, Dillw. (*Annal. Sc. Nat.* 1824, i. pp. 309–321).—Resumé méthodique de la Classification des Thalassiophytes. Strassbourg, 1828. 8vo. 59 pag. (*e Dict. Sc. Nat.* vol. liii. seorsim impress.)

Geoffroi, I. C., Observations sur le Nostoch, qui preuvent que c'est veritablement une Plante (*Mém. de l'Academ. des Sc. de Paris*, 1768, p. 293).

Gerarde, I., The Herbal, or General History of Plants, enlarged by T. Johnson. London, 1633. Fol.

GERVAIS, Baccillaria (*d'Orbigny Dict. Univ. d'Hist. Nat.* ii. 412).—Lettre sur les Eponges d'Eau douce (*Compt. Rend.* 1835, i. 260–262).

GESNER, C., Historia Plantarum. Basileæ, 1541. 8vo.

GIFFORD, ISABELLA, The Marine Botanist. Brighton, 1853. 12mo.

GILGENCRANTZ, PH., Notice sur les Algues marines, et la Manière de les préparer pour les Collections (*Mém. Soc. des Scienc. de l'Agricult. et des Arts à Lille.* 1833, pp. 129–136).

GINNANI, G., Opere postume. Venezia, 1757. Fol.

GIROD-CHANTRANS, Recherches chimiques et microscopiques sur les Conferves, les Bisses et les Tremelles. Paris, 1802, 4to. —Géographie physique du Département du Doubs. Paris, 1810. 8vo. — Sur l'Analyse chimique des Conferves (*Bullet. Soc. Philomat.* i. 59). — Observations sur la Nature du Bissus velutina (*Magaz. Encyclop.* iii. 154).

GLEDITSCH, I. C., Lucubratiuncula de Fuco subgloboso sessili et molli (*Nostoc pruniformi*). Berlin, 1743. 4to. — Von der Kugelpflanze oder der sogenannten Seepflaume (*Physik. Bot. Oeconom. Abhandl.* iii. 1).

GMELIN, S. G., Historia Fucorum. Petropoli, 1768. 4to.

GÖPPERT, H. R., Bemerkungen über das Vorkommen von Pflanzen in heissen Quellen, und in gewöhnlich warmem Boden (*Wiegmann's Archiv.* 1837, i. pp. 201–210).

GOODENOUGH, S., et WOODWARD T. I., Observations on the British Fuci, with particular descriptions of each species. (*Linn. Transact.* iii. 84. ss.)

GOODSIR, I., On the Conferva which vegetates on the Skin of the Goldfish. (*Annals of Nat. Hist.* 1842, viii. pp. 333–337).

GOUAN, A., Flora Monspeliensis. Lugduni, 1765. 8vo.

GRATELOUP, D. M., Cryptogamie Tarbellienne, ou Description succincte des Plantes cryptogames qui croissent aux Environs de Dax. (*Act. Soc. Linn. de Bordeaux*, 1835, vii. pp. 247–314).

GRATELOUP, I. P. A. G., Observations sur la Constitution de l'Été de 1806, avec un Appendix sur les Conferves. Montpell. 1808. 4to.

GREVILLE, R. K., An Account of some of the Cryptogamous Plants of Devonshire (*Mem. of the Werner. Nat. Hist. Soc.* 1821, iii. pp. 351–370, t. 15. 16.—Description of a new Species of Fucus, found in Devonshire (*Mem. of the Werner. Nat. Hist. Soc.* 1821, iii. pp. 396–399. i. 19).—A Description of two new Plants of the Order Algæ, found in Scotland (*Mem. of the Werner. Nat. Hist. Soc.* 1822, iv. pp. 213–217. tab. 8).—Scottish Cryptogamic Flora. Edinb. 1823–1828. 8vo. 6 vols.—Flora Edinensis. Edinb. 1824. 8vo. — Descriptiones novarum Specierum ex Algarum ordine (*Nov. A. N. C.* 1829, xiv. i. pp. 421–424. tab. 26).—Algæ Britannicæ, or Description of the Marine and other Inarticulated Plants of the British Islands belonging to the Order Algæ, with Plates illustrative of the Genera. Edinb. and London, 1830. 8vo. (*Præmittitur: Synopsis Generum*).—On the Economical Uses of the Marine Algæ or Sea-weeds (*Edinb. Journ. of Nat. and Geograph. Sc.* 1830, i. pp. 345–349).—Description of two New Species of Algæ (*Edinb. Journ. of Nat. and Geogr. Sc., New Ser.* No. 3. p. 148).—Descriptiones Algarum Brasiliensium (*in St. Hilaire, Voyage dans le Dist. des Diamans*, Paris, 1833, 8vo. ii. p. 423).—Some Account of a Collection of Cryptogamic Plants from the Ionian Islands (*Linn. Transact.* xv. 2. p. 335).—List of the Genera of Algæ (*Lindley, Introduct.* Ed. 2, 1836, pp. 436, 437).

GRIFFEN. Botanical, Chemical, and Medical Properties of the Fucus edulis, L. New York, 1816. 8vo.

GRIFFITH and HENFREY'S Micrographic Dictionary. London, 1860. 8vo.

GRUITHUISEN, FZ. P., Die Branchienschnecke und eine aus ihren Ueberresten hervorwachsende lebendig gebärende Conferve (*Nov. A. N. C.* x. 437. ss.)

GUETTARD, I. E., Observations sur les Plantes. Paris, 1747, 8vo. 2 vols.

GUILLEMIN, I. B. A., Zephyritis taitensis (*Nouv. Annal. Sc. Nat.* 1826, vi. 297–320).— Tremellaria (*in Dict. Class. d'Hist. Nat.* xvi. 342).

GUNNERUS, I. E., Flora Norvegica. Hafniæ, 1766 et 1772, Fol. 2 vols.—Efteretning om de saakaldte Lösningstene eller Vettengrer, om Oimestene og nogle andre udenlandske Frugter, som findes hist og her ved stranden i Norge (*Frondhiemske Selsk Skrift.* iii. 15).—Om mogle norske Planter (iv. 18–86).

HAEMMERLEN, D. A., Dissertatio de Fuco helminthochorto. Erlang, 1792, 8vo.

HALLER, A., Historia stirpium indigenarum Helvetiæ. Bernæ, 1768, fol. 2 vols.

HANOVER, Production d'une Conferve sur la Salamandre aquatique (*Nouv. Annal. Sc. Nat.* 1840, xiv. pp. 165–167).

HANOW, M. C., Nachrichten von der See-Eiche (*Hamb. Magaz.* xvi. 581).

HARLAN, R., Description of an Extinct Species of the Family Fucoides (*Journ. of the Academ. of Philadelph.* 1833, vi. 289–295).

HARVEY, H., Notice of a Collection of Algæ communicated to Dr. Hooker by Mrs. Ch. Telfair, from Cap Malheureux in the Mauritius (*Hooker Journ. of Bot.* 1834, i. 147–157).—Algological Illustrations: I. Remarks on some British Algæ, and Descriptions of New Species recently added to our Flora. (*Hooker, Journ. of Bot.* 1834, i. pp. 296–305, t. 138, 139).—Algæ Beechyanæ (*Hook. et Grev. The Botany of Capt. Beechey's Voy.* pp. 54, 77, 110, 134, 163, 257, 275, 406).—The Genera of South African Plants. Cape Town, 1838, 8vo.—Description of Ballia, a new Genus of Algæ (*Hooker, Journ. of Bot.* 1840, ii. pp. 190–193, t. 9).—A Manual of British Algæ. London, 1841. 8vo.—Phycologia Britannica. 4 vols. London, 1846–1851. 8vo.—Nereis Boreali Americana (*Smithsonian Institut. Washington*). 3 parts, 1851–1858. 4to.—Phycologia Australica. London, 1858. Now publishing in monthly parts.—Atlas of British Algæ. London, 1857. 4to.—Synopsis of British Algæ. London, 1857. 12mo.

HASSALL. A History of the British Fresh-Water Algæ. London, 1845. 8vo.

HEDWIG, R. A., Commentatio de Tremella Nostoc. Lipsiæ, 1798. 4to.

HENSCHEL, Wiederbelebung der fossilen Algen (*Archiv. für die gesammte Naturlehre*, xiii. 2, p. 229).

HENSLOW, I. S., On the Fructification of the Genus Chara (*Loudon, Magaz. of Nat. Hist.* 1832, v. pp. 348–349.

HERING, Diagnoses Algarum novarum a Ferd. Krauss in Africa australi lectarum (*Annals of Nat. Hist.* 1842, viii 90–92).

HEYDEN, C. VON., Ueber Tremella meteorica (*Mus. Senkenberg*, ii. p. 304).

HOFMANN-BANG, N., De usu Confervarum in Œconomia Naturæ. Hafniæ, 1818. 8vo.

HOGG, I., Observations on the Spongilla fluviatilis (*Linn. Transact.* xviii. pp. 363, 367). — Farther Observations on the Spongilla fluviatilis, with some Remarks on the Nature of the Spongiæ marinæ (*Ibid.* xviii. pp. 368–407.)

HOOKER, W. J., Journal of a Tour in Ireland in the summer of 1809, Lond. 1811, 8vo. Edit. 2, Lond. 1813, 8vo. 2 vols.—Flora Scotica. Lond. 1821, 8vo. —Flora Londinensis. New Series, Lond. 1821, ss. fol. — On Palmella nivalis (*Parry, Journ. of a Second Voyage for the Discovery of a North-West Passage.* Lond. 1825, App. p. 428).—On English Charæ (*Philosoph. Magaz. and Journ. of Sc.* 1838, xii. 97).—British Flora. Vol. ii. London, 1833.

HORNEMANN, I. W., Forsög til en dansk oekonomisk Plantelaere. 2 Opl. Kiobenh. 1806, 8vo.—Fucus buccinalis (*Dansk. Videnskab. Selskabs naturvidensk. Abhandl.* 1828, iii. p. 379).

HORNSCHUCH, Einige Beobachtungen und Bemerkungen über die Entstehung und Metamorphose der niederen vegetabilischen Organismen (*Nov. A. N. C.*, 1821, x. 1, 513–582, t. 48. 49).

HUDSON, P., Flora Anglica. Londini, 1798. 8vo.

IMPERATI, FER., Historia Naturale. Napoli, 1599, 4to.

JACQUIN, N. I., Collectanea ad Botanicam Chemiam, et historiam naturalem spectantia. Vindob. 1785–1796. 4to., vols. 1–4.

JOHNSTON, DR., A History of British Zoophytes. 2 vols. London, 1847. 8vo.

JONES, I. P., et KINGSTON, I. F., Flora Devoniensis, or a Descriptive Catalogue of Plants growing wild in the county of Devon, arranged both according to the Linnean and Natural Orders. London, 1829. 8vo.

JÜRGENS, G. H. B., Algæ Aquaticæ, quas et in littore maris dynastiam Jeveranam et Frisiam orientalem alluentis rejectas, et in harum terrarum aquis habitantes collegit et exsiccavit. Jever, 1816–1822, fol. Dec. 1–20.

JUSSIEU, A. L., Genera Plantarum secundum ordines naturales disposita. Parisiis, 1789. 8vo.

KAULFUSS, P., Erfahrungen über das Keimen der Charen. Leipzig, 1825. 8vo. c. ic.

KLEIN, Dubia circa plantarum marinarum fabricam. Petropoli, 1760. 4to.

KNIPHOF, I. H., Physikalische Untersuchung des Pelzes, welchen die Natur durch Fäulniss auf einigen Wiesen hervorgebracht, 1752. Frankfort, 1753. 4to.

KOELREUTER, J. T., Descriptio Fuci foliacei frondibus fructificantibus papillatis, (*Nov. Comment. Petrop.* xi. p. 424).

KRAMER, G. H., Elenchus vegetabilium et animalium per Austriam inferiorem observatorum. Viennæ, 1756. 8vo.

KRAUSS, CHR. F. H., Beitrag zur Kenntniss der Corallinen und Zoophyten der Südsee. Stuttg. 1837, 4to. 38 pg. c. ic.

KÜTZING, G., Algarum aquæ dulcis germanicarum Decades. Halle, 1833, seqq. 8vo. Dec. 1–10.— Algologische Excursion am salzigen See im Mansfeldischen im J. 1832 (*Flora*, 1832, pp. 97–101). —Ulothrix, eine neue Gattung aus der Familie der Algen (*Flora*, 1833, ii. 517. *Nouv. Annal. Sc. Nat.* i. 189).— Ueber die Gattungen Melosira u. Fragilaria (*Linn.* 1833, viii. pp. 66–73).—Beitrag zur Kenntniss über die Entstehung und

Metamorphose der niederen vegetabilischen Organismen, nebst einer systematischen Zusammenstellung der hieher gehörigen niederen Algenformen (*Linnæa*, 1833, viii. pp. 335–385. cum tabb. 3; *Vers. gallic. in Nouv. Annal. Sc. Nat.* 1834, pp. 129–140, 217–230, 231–337, 361—ss.)—Sphærotilus natans, eine neue Süsswasseralge (*Linnæa*, 1833, viii. pp. 385–387, c. tab).—Algologische Mittheilungen. 1. Ueber Gloionema. 2. Ueber eine neue Gattung der Confervaceen (*Flora*, 1833, ii. pp. 512–521).—Synopsis Diatomacearum, oder Versuch einer systematischen Zusammenstellung der Diatomeen (*Linnæa*, 1833, viii. pp. 529–620. cum tabb. 7. etiam seorsim impr). — Beschriebung einiger neuen Arten der Gattung Chara. (*Flora*, 1833, ii. pp. 705–707). — Verwandlung der Microcystis umbrina, Ktz. in Alysphæria chlorina, Turp. (*Flora*, 1834, ii. pp. 673–676).—Verzeichniss verkäuflicher Algen (*Flora*, 1836, Intelligbl. pp. 13–16).—Ueber die Polypières calcifères des Lamouroux. Nordhausen und Leipzig, 1841. 4to. 33 pag.—Ueber drei verschiedene Systeme des Tanggewebes (*Linnæa*, 1841, xv. pp. 546–552; *Flora*, 1842, i. pp. 116, 117). — Ueberdie Farben der Meeresalgen (*Flora*, 1842, i. pp. 123, 124).—Ueber Ceramium, Agardh (*Linnæa*, 1841, xv. pp. 727–746).—Ueber die Eigenthümlichkeit der Vegetation in den chinesischen und japanischen Meeren (*Bot. Zeit.* 1843, Nr. 4).—Die Umwandlung neiderer Algenformen in Haliëre. Haarlem, 1841. 4to.—Phycologia Germanica. Nordhausen, 1845. 8vo. — Tabulæ Phycologicæ. Nordhausen, 1846. 8vo.—Ueber die Verwandlung der Infusorien in niedre Algenformen. Nordhausen, 1844. 4to. — Die Kieselschaligen Bacillarien oder Diatomeen. Nordhausen, 1844. 4to.—Phycologia generalis ordines Anatomie, Physiologie und Systemkunde der Tange. Leipzig, 1843. 4to.

Kylling, P., Viridarium Danicum. Hafniæ, 1688. 4to.

Labillardière, J. F., Novæ Hollandiæ Plantarum Specimen. Parisiis, 1804–1806, fol. 2 vols.

Lamouroux, J. V., Dissertation sur plusieurs Espèces de Fucus. Agen, 1805. 4to. —Essai sur les Genres de la Famille des Thalassiophytes non articulées (*Annal. Mus.* 1813, xx. pp. 22, 116, 267, c. ic. et seors. impress.). — Description de deux Espèces inédits de Varecs (*Bullet. Philomat.* ii. p. 131).—Sur le Varec polymorphe (*Bullet. Philomat.* iii. p. 194). — Mémoire sur trois nouveaux Genres de la Famille des Algues marines (*Dictyopteris, Amansia, Bryopsis*), *Journ. Bot.* 1809, p. 129).—Mémoire sur les Caulerpes (*Journ. Bot.* 1809, p. 136). —Nouvelles Observations sur la Physiologie des Algues marines (*Journ. Bot.* 1809, ii. 32).— Histoire des polypiers coralligènes flexibles. Caen, 1816. 8vo. —Mémoire sur la Géographie des Plantes marines (*Annal. Sc. Nat.* 1826, vii. pp. 60–82). — Varia in *Dict. Class. d'Hist. Nat.* sub vocibus: Acetabulaire, 1, 72. — Alcyonidie, 1, 206. — Algue, 1, 213. — Amansia, 1, 246. —Anadyomene, 1, 313.—Asperocoque, 2, 23.— Atomaire, 2, 66. — Baillouviana, 2, 139. — Bangie, 2, 184. — Bandrier de Neptune, 2, 233. —Bolithao, 3, 391. — Bourse de Mer, 2, 458. —Bryopsis, 2, 540.—Capillaria, 3, 164. — Caulerpe, 3, 280. — Céramianthème, 3, 341. — Chicorée de Mer, 3, 592. —Chlépidole, 4, 38. — Chondre, 4, 58. — Chondrie, 4, 59. — Chorde, 4, 62. — Chordarie, 4, 63.—Circulation, 4, 144 (Circ. dans les Hydrophytes, p. 153). — Claudea, 4, 191. — Dasyphylle, 5, 334. — Dawsonie, 5, 367. — Delesserie, 5, 386. — Delisée, 5, 389. — Dendroide, 5, 397.— Desmarestie, 5, 438.—Diaphysistées, 5, 457. —Dictyoptère, 5, 482. —Dictyote, 5, 483.—Dictyotées, 5, 484.—Djamma, 5, 751.—Dumontie, 5, 642.—Echinelle, 6, 31.—Écorce, 6, 53.—Endive marine, 6, 160. — Endochrome, 6, 161. — Endophragme, 6, 163.—Endosperme, 6, 164. Epiphylle, 6, 230.—Espérie, 6, 313.— Flabellaire, 6, 525.—Flagellaria, 6, 529. —Floridées, 6, 547.—Fouet de Neptune, 6, 583.—Fucacées, 7, 66.—Fucoidées, 7, 72.—Fucus, 7, 72.—Funiculaire, 7, 82.—Fuscellaire, 7, 83.—Gastridie, 7, 161.—Gelidie, 7, 190.—Géographie, 7, 239.—Gigantée, 7, 346.—Gigantine, 7, 346.—Goemon, 7, 429.—Granulaire, 7, 472.—Halidre, 8, 17.—Haliseris, 8, 22. —Halyménie, 8, 27.—Helminthochorton, 8, 107.—Herbacée, 8, 131.—Himanthalié, 8, 199.—Hippurine, 8, 226.— Hydrophylle, 8, 435.—Hypnée, 8, 496. —Hypnophylle, 8, 476.

Landsborough's Popular History of British Algæ. London, 1851. 12mo.

Laudt, J., Beskrivelse over Faeröerne, Kiobenh. 1800. 8vo.

Laurer, Beiträge zur kryptogamischen Flora der Insel Rügen (*Flora*, 1827, i. pp. 289–299.)

Lebaillif. Observations sur la Circulation des Chara (*Ferrusac, Bullet. des Sc. Nat.* 1827, xii. p. 321).

Leiblein. Verzeichniss der Wasseralgen, welche sich in der Gegend um Würzburg vorfinden (*Flora*, 1827, i. pp. 257–266 et 273–281). —Algologische Bemerkungen (*Flora*, 1830, pp. 305–318, 323–335, 337–351).

Leliévre de la Marinière et Prouchet. Hydrophytes marines du Morbihan (*Nouv. Annal. Sc. Nat.* 1841, xv. pp. 303, 304).

Lepechin, J., Quatuor Fucorum Species descriptæ (*Nov. Comm. Academ. Petrop.* 1774, xix. 476).

Lightfoot, J., Flora Scotica; or a Systematic Arrangement of the Native Plants of Scotland and the Hebrides. London, 1777. 8vo.

Lindenberg, Dr., Conferva Lehmanniana, nov. spec. (*Linnæa*, 1840, xiv. pp. 179, 180).

Link, H. J., Nova Plantarum genera e classe Lichenum, Algarum, Fungorum (*Schrader, N. Journ. für die Bot.* 1809, iii. 1).—Epistola de Algis aquaticis in genera disponendis (*Hor. Phys. Berol.* 1820, 1–8).—Ueber Pflanzenthiere überhaupt, und die dazu gerechneten Gewächse besonders (*Abhandlung. der. Berl. Academie der Wissenschaft*, 1830, p. 109. *ss. Gall. in Nouv. Annal. Sc. Nat.* 1834, ii. p. 321).—Ueberden inneren Bau und die Früchte der Tangarten (*Abhandl. der Berl. Academ.* 1834, p. 322).—Jahresbericht über die bekannt gewordenen Arbeiten für Anatomie und Physiologie der Pflanzen aus den Jahren 1840–41 (*Wiegmann, Archiv.* vii.).

Linnæus, Carol., Systema Naturæ, ed. 12. Holmiae, 1765. 8vo.—Amœnitates Academicæ. Holm. et Erlang, 1749–1790. 8vo. 10 vols.—Species Plantarum, ed. 2. Holmiae, 1762. 8vo. 2 vols.—Mantissa Plantarum. Holmiae, 1767–1771. 8vo.—Flora Lapponica, ed. 2. Lond. 1792. 8vo.—Oelandska och Gothlandska Resa. Stockh. och Upsall, 1745. 8vo.—Skanska Resa. Stockh. 1751. 8vo.

Linne. Natura pelagi. Upsaliæ, 1757. 4to.

Lobarzewsky, Hyac. V., Einige Diatomaceen der Ost küste des adriatischen Meeres (*Linnæa*, 1840, xiv. pp. 265–277, c. icc.—Ueber eine wahre Saftströmung in Closterium Lunula (*Linnæa*, 1840, xiv. pp. 278–284).

Lobelius, M., Plantarum s. Stirpium Icones. Antwerp, 1581. 4to obl.

Loeselius, J., Flora Prussica s. Plantæ in regno Prussiæ sponte nascentes, cur. J. Gottsched. Regiom. 1703. 4to.

Loudon, J. C., Encylopædia of Plants. Lond. 1829. 8vo. (*Algæ*, pp. 924–947.)

Luce, D. J. W. L., Vorläufige Bemerkungen über den Fucus vesiculosus (*Usteri Annal. d. Bot.* xv. 39).

Ludwig. De Vegetatione plantarum marinarum. Lipsiæ, 1736. 4to.

Lyell, Ch., On Gyrogonites (*Transact. of the Lond. Geol. Soc.* 1825, ii. 73–96).

Lyngbye, H. C., Tentamen Hydrophytologiæ Danicæ, continens omnia Hydrophyta, cryptogama Daniæ, Holsatiæ, Færoæ, Islandiæ, Grönlandiæ hucusque cognita, systematice disposita, descripta et iconibus illustrata, adjectis simul speciebus Norvegicis. Hafniæ, 1819. 4to.

Macaire-Princep et Marcet. Analyse de la Neige rouge du Pôle (*Mém. Soc. Phys. et Sc. Nat. de Génève*, 1828, iv. pp. 185–188).—Notice sur la Matière qui a coloré en rouge le Lac de Morat (*Mém. Soc. Phys. Génèv.* 1825, ii. 2, pp. 29–42).

Magnolius, P., Hortus regius Monspeliensis. Monspelii, 1697. 8vo.

Mandruzzalo, S., Dei Bagni di Abano. Padova, 1789. 8vo.

Marquis, A. L., Considérations sur quelques Végétaux du dernier ordre. (Rouen, 1826. 8vo. p. 40.)

Marsilli, Lud. Ferd., Brieve ristretto del Saggio fisico intorno alla storia del Mare. Venezia, 1711. 4to.—Histoire physique de la Mer (trad. par le Clerc.) Amsterd. 1725. fol.

Martens, Von, Reise nach Venedig, 1828, 8vo.—Ueber Valonia intricata (*Flora*, 1830, p. 681).—Ueber Jürgens algologische Sammlung (*Flora*, 1830, ii. pp. 410, 417).—Zur Morphologie der Algen (*Flora*, 1832, i. pp. 123–127).

Martens et Hering. Ueber die Amansia jungermannioides u. Amphiroa pustulata (*Flora*, 1836, pp. 481–491. *Nouv. Annal. Sc. Nat.* 1837, vii. p. 282).

Martius, Car. F. Philipp De, Flora Cryptogamica Erlangensis. Erlang. 1800. 8vo.—Ueber den Bau und die Natur der Charen. 1818 (*N. A. N. C.* ix. pp. 179–214, 1, 2, 3).—De Fuci versiculosi ortu et incrementis, 1818 (*N. A. N. C.* ix. pp. 215–226, t. 4).—Icones selectæ Plantarum Cryptogamicarum, quas in Itinere per Braziliam annis 1817–1820 suscepto collegit et pingendas curavit. Monachii, 1828. 4to.—Flora Brasiliensis. Stuttg. 1833. 8vo. tom. 1.

Matthiolus, P. A., De plantis Epitome, novis iconibus descriptionibusque pluribus et accuratioribus locupletata a Joach. Camerario. Francof. ad Moen. 1586. 4to.

Maximovitsch. Observationes de Formatione materiæ viridis Pristleyanæ (*russice in Nowi Magazine iestiestvennoi istorii Mosc.* Jan. 1826, Nr. 1, p. 63).

Mayer, J., Beobachtungen über die Befruchtungstheile einer besonderen Ulva (*Naturforscher*, xvii. *Stück.* p. 165).

Meese, Dav., Beschryving van en zonderlinge Zee-plant (Laminaria digitata) in: *Het* 19, *Classe van de Genera plantarum van Linnæus apgeheldert. Leeuwarden*, 1761. 8vo. p. 135.

Meisser. Analyse des Ouvrages les plus recens sur la Cryptogamie aquatique (*Annal. Gen. Sc. Phys.* 1819, ii. pp. 161–185).

Meneghini, J., Conspectus Algologiæ Euganeæ. Patavii, 1836. 8vo.—De Bryopsidum fructificatione (*Flora*, 1837, ii. pp. 721–726, t. 2).—Cenni sulla organografia e fisiologia delle Alghe. Padova, 1838. 4to.—Synopsis Desmidiearum hucusque cognitarum (*Linnæa*, 1840, xiv. pp. 201–240).—Algæ Liguricæ (*Giornal dei literat. Ital. Pisâ*, 1840. *Flora*, 1840, ii. pp. 571, 572).—Sunto di una memoria, diretta a mostrare i rapporti tra le Alge e le Licheni (*Congresso Scient. III. adun. in Firenze*, 1841, *Adunanza del di* 16 *Sept.*)—Monographia Nostochinearum, additto specimine de Rivulariis. Aug. Taurin, 1842. 4to. c. icc. (*Ex Act. Academ. Taurin.* ii. Ser. 5, seorsim impr.)—Alghe Italiane e Dalmatiche. Padova, 1842–1846. 8vo. c. icc. fasc. 1–5.—Sulla animalità delle Diatomee e revisione dei Generi di Diatomee stabiliti dal Kützing. Venezia, 1845. 4to.—Sulla teoria de' meritalli di Gaudichand. Firenze, 1844. 8vo.

Mentzel, C., De Coralliis in genere, Androsace, Fucis marinis, etc. (*Miscellanea Ac. N. C.* Dec. ii. ann. 3, Obs. 21).

Merretti, C., Pinax rerum naturalium Britannicarum continens vegetabilia, animalia et fossilia. Londini, 1668. 8vo.

Mertens, J. C., Ueber die Esper'schen Fuci (*Schrader's Journal*, 1800, p. 170, et 1801, p. 32).—Recensio Historiæ Fucorum Turneri (*Allgemeine Litterat. Zeit.* 1810).—Sur plusieurs Espèces de Fucus nouvelles, ou peu connues, observées dans les Collections du Museum d'Histoire Naturelle de Paris (*Mém. du Mus.* 1819, v. 172–190, t. 13–15 : *Annal. Gen. Sc. Phys.* 1820, iv. pp. 47–50).

Mertens, H., Bericht über verschiedene Fucus-Arten (*Linn.* 1829, iv. pp. 43–58.)

Meyen, J., Kritische Beiträge zum Studium der Süsswasser-Algen (*Flora*, 1827, ii. pp. 705–730, t. 2).—Beobachtungen und Bemerkungen über die Gattung Chara (*Linn.* 1827, ii. pp. 55–81, t. 1, 3).—Ueber die Pristley'sche grüne Materie, wie über die Metamorphose des Protococcus viridis in Pristleya botryoides und in Ulva terrestris (*Linn.* 1827, ii. pp. 388, 389, t. 8).—Ueber das Genus Spirogyra, Link, und über die Bewegung und Metamorphose der Sp. princeps insbesondere (*Linn.* 1827, ii. pp. 410–432).—Beiträge zur Physiologie und Systematik der Algen, 1829 (*N. A. N. C.* xiv. ii. pp. 428–496, t. 27–30).—Beobachtungen über einige niedere Algenformen, 1829 (*N. A. N. C.* xiv. pp. 769–778, t. 43).—Essbare Tange (*Reise um die Erde*, ii. 276; *Wiegm. Archiv.* 1835, i. pp. 131, 132).—Ueber die stengelartige Bildung beim Fucus pyriferus (*Wiegm. Archiv.* 1835, pp. 389–392, tab. 5.)—Beiträge zur Bildungsgeschichte verschiedener Pflanzentheile (*Müller's Archiv.* 1839, pp. 255–279).—Jahresberichte über die Resultate der Arbeiten im Felde der physiologischen Botanik (*Wiegm. Archiv*, i.–vi.)

Meyer. De Fuco vesiculoso atque de Todo. Kiliæ, 1830. 4to.

Micheli, P. A., Nova plantarum genera, juxta Tournefortii methodum disposita, Florentiæ, 1729. 4to.

Mikan. Ueber Pilæ marinæ (*Flora*, 1838, ii. p. 443.)

Miquel, F. A. W., Sur une nouvelle Espèce de Draparnaldia (*Bullet. d. Sc. Phys. et Nat. en Neerlande*, 1838, pp. 18, 19).—Over het Sargasso of Zeekroos (*Van der Hoeven en Vriese Tydschrift*, 1837, iv. pp. 25–41).—Notice sur le Sargasse d'Océan (*Bullet. d. Sc. Phys. et Nat. en Neerlande*, 1838, pp. 18, 19).—Remarques servant à illustrer l'Histoire et la Nature du Sargasse de l'Océan (*Ibid.* 1839, pp. 198–200).

Mirbel. Rapport sur la Flore des Iles Malouines de M. Gaudichaud (*Annal. Sc. Nat.* 1825, v. 88–110).—Rapport sur la Flore des Malouines de M. d'Urville (*Annal. Sc. Nat.* 1827, vi. pp. 469–476). Rapport sur le Mémoire de M. Lamouroux, intitulée : de la Géographie Botanique marine (*Annal. Sc. Nat.* 1825, vi. pp. 469–475).

Möhring, P. G., Fucus caule tereti, folio singulari oblongo, marginibus undulatis (Laminaria saccharina) *Act. Acad. Nat. Cur.* 1748, viii. 450.

Mohl, H., Ueber die Verbindung der Pflanzenzellen unter einander. Münch. 1835, 8vo.—Erläuterung und Vertheidigung meiner Ansicht von der Structur der Pflanzensubstanz. Tübing. 1836. 4to.—Ueber die Vermehrung der Pflanzenzellen durch Theilung. Tübingen, 1835. 8vo. (*Flora*, 1837, i. 17–31).—Ueber ein von Ehrenberg angegebenes Unterscheidungskennzeichen der Thiere und Pflanzen. (*Flora*, 1836, i. pp. 491–494).

Mohr, D. M. H., Observationes Botanicæ. Kiloniæ, 1803. 8vo.—Ueber Conferva fluviatilis u. torulosa (*Schrader's Journ.* 1801, i. p. 313).—Supplementum Floræ Goettingensis Cryptogamæ (*Schrader's Journ.* 1806, p. 196).—Bemerkungen über die Rothischen Rivularien (*Weber, Beitr. zur Naturkunde*, ii. p. 343).

Mohr, N., Forsög til en Islandsk Naturhistorie. Kiöbenhaven, 1786. 8vo.

Montagne, Camill, Description de plusieurs nouvelles Espèces des Cryptogames découvertes par M. Gaudichaud dans l'Amérique méridionale (*Nouv. Annal. Sc. Nat.* 1834, iii. pp. 73–79, et 368–380).—Prodromus Floræ Fernandesianæ. Pars I,

sistens enumerationem plantarum cellularium, quas in insula Juan Fernandez collegit Bertero (*Nouv. Annal. Sc. Nat.* 1835, iii. pp. 347–356; iv. pp. 86–99).—Notice sur les Plantes Cryptogames récemment découvertes en France (*Nouv. Annal. Sc. Nat.* 1836, vi. pp. 321–327).—Phytographia Canariensis, Plantæ Cellulares. Paris, 1836. 4to. (*Barker Webb et Berthelot, Histoire Naturelle des Iles Canaries*, tom. iii. part 2.)—Centurie de Plantes cellulaires exotiques nouvelles (*Nouv. Annal. Sc. Nat.* 1837, viii. pp. 345–370).—Seconde Centurie des Plantes Cellulaires exotiques nouvelles (*Ibid.* 1840, xiii. pp. 193–207, cont. 1841, xvi. pp. 266–282).—Troisième Centurie des Plantes cellulaires exotiques nouvelles (*Nouv. Annal. Sc. Nat.* 1842, xviii. pp. 241–282). — Algæ Patagonicæ. 1838 (*D'Orbigny, Sertum Patagonicum. Voy. Amér. Mérid. Bot.* i.)— Algæ Bolivienses. 1838 (*D'Orbigny, Florula Boliviensis, Voy. Amér. Mérid. Bot.* ii.)— De l'Organisation et du Mode de Reproduction des Caulerpées, et en particulier du Caulerpa Webbiana (*Compt. Rend. Academ. Sc.* 1838, pp. 269–274; *Nouv. Annal. Sc. Nat.* 1838, ix. pp. 129–150).—Cryptogames algériennes, ou Plantes cellulaires recueillies par M. Roussel aux Environs d'Alger. (*Nouv. Annal. Sc. Nat.* 1838, pp. 268–279, 334–345 et 382). — Cryptogamæ Brasilienses, seu Plantæ cellulares, quas in Itinere per Brasiliam collegit Aug. St. Hilaire (*Nouv. Annal. Sc. Nat.* 1839, xii. p. 42–55).—Sur le Callithamnion clavatum et sa Synonymie (*Nouv. Annal. Sc. Nat.* 1839, xii. pp. 166–169). — Algæ Hispanicæ, 1839 (*Barker Webb, Otia hispanica. Pentas I.*) — Flore de l'Ile de Cuba. Plantæ Cellulares. Paris, 1840. 4to. c. tabb. in fol. (*Ramon de la Sagra, Histoire physique, politique et naturelle de l'Ile de Cuba*). — Considérations succinctes sur la Tribu des Laminariées de la Sous-famille des Fucacées, et Caractères sur lesquels est établi le nouveau Genre Capea (*Nouv. Annal. Sc. Nat.* 1840, xiv. pp. 48–54).—Recherches sur la Structure de Nucleus des Genres Sphæroplion et Lichina (*Nouv. Annal. Sc. Nat.* 1841, xv. pp. 146–156).—Histoire et Synonymie du Dasya arbuscula (*Nouv. Annal. Sc. Nat.* 1841, xv. pp. 173–179).—Du Genre Xiphophora, et à son occasion, Recherches sur cette Question: Trouve-t-on dans les Fucacées les deux Modes de Propagation qu'on observe chez les Floridées? (*Nouv. Annal. Sc. Nat.* 1842, xviii. pp. 200–206).—Prodromus Generum Specierumque Phycearum novarum, in itinere ad polum antarcticum ab illustri Dumont d'Urville peracto collectarum, notis diagnosticis hic tantum evulgatarum, descriptionibus vero fusioribus, nec non iconibus analyticis jam jamque illustrandarum. Paris, 1842. 8vo. 16 pag.—Varia in *d'Orbigny, Dict. Univ. d'Hist. Nat.* sub vocibus: Acanthophora, 1, 34. — Achlya, 1, 72. — Acropeltis, 1, 103.—Agardhia, 1, 164. — Agarum, 1, 186.—Algues, 1, 272. —Alsidium, 1, 300.—Alysium, 1, 317. —Anhaltia, 1, 509.—Aphonizomenon, 1, 645.—Arthrocladia, 2, 173.—Article, 2, 180.—Articulées, 2, 182.—Asparagopsis, 2, 223.—Asperocaulon, 2, 226. —Aspérocoque, 2, 226.—Atomaria, 2, 309.—Audouinelle, 2, 332.—Ballia, 2, 447.—Bangie, 2, 456.—Bindera, 2, 576. —Blossevillea, 2, 609.—Bolbochæte, 2, 639. — Bonnemaisonia, 2, 648.— Bostrychia, 2, 660.—Botrydine, 2, 672.— Botrydion, 2, 672. — Botryocarpa, 2, 673.—Botrytella, 2, 673.—Brongniartella, 2, 741.—Bryopsis, 2, 754.—Byssacées, 2, 790.—Byssus, 2, 794.—Structure et Fructification des Genres Ctenodus, Delisea et Lenormandia. Paris, 1844. 8vo. —Sur le Phénomène de la Coloration des Eaux de la Mer Rouge. Paris, 1844. 8vo. —Sur un nouveau fait de Coloration des Eaux de la Mer par une Algue microscopique. Paris, 1846. 8vo.

Mont-Sainct. Lettre missive à un Sieur Amy sur le fait prodigieux d'une pluye rouge comme sang. In ejus Le Jardin Senenois. Sens, 1604.

Moris, Jos., et De Notaris, Jos., Florula Caprariæ. Taurini, 1839. 4to. (*Memorie della Academia di Torino.* Ser. 2. tom. ii. p. 59, ss.)

Morison, R., Plantarum Historia Universalis Oxoniensis. Oxonii, 1660–1699. Fol.

Morren. Observations sur la Fragilaria lineata, Lyngb. (*Messager des Sc. et Arts de Gand*, 1829, *Liv.* 5, 6; *Flora*, 1833, *Litterabl.* iii. 222).—Sur un Végétal microscopique d'un Genre nouveau proposé sous le Nom de Crucigénie (*Mém. lu à la Soc. d'Hist. Nat. de Paris*, 8 *Juill.* 1830). — Mémoire sur les Closteries (*Nouv. Annal. Sc. Nat.* 1835, v. pp. 257–280). — Recherches physiologiques sur les Hydrophytes de la Belgique. Bruxelles, 1838. 4to.—De l'Existence des Infusoires dans les Plantes (*Bullet. Academ. de Bruxelles*, vi. n. 4).

Mougeot, J. C., et Nestler, C., Stirpes cryptogamæ Vogeso-Rhenanæ, in Rheni superioris inferiorisque, nec non Vogesorum præfecturis nascentes. Brugerii, 1810. seqq. 4to. Fasc. 1–9.

Müller, C., Ueber die Conferva Orthotrichi (*Flora*, 1841, i. pp. 161–170, 177–185, t. 1).—Ueber Einschlüsse der Moreasteine (*Flora*, 1842, pp. 289–304, t. 1).

— Entwicklungsgeschichte der Chætophora tuberculosa (*Flora*, 1842, ii. pp. 513–517, t. 3).

Müller, O. F., Flora Fridrichsthaliana, sive methodica descriptio plantarum in agro Fridrichsthalensi, simulque per regnum Daniæ crescentium. Argentorati, 1767. 8vo.—Von einer sonderbaren Conferva (*Conferva stellaris, Naturforscher* vii. 189).—Die Wassererbse. Nostoc sphæricum (*Naturforscher*, xvii. 153).—Von unsichtbaren Wassermoosen (*Beschäftigungen der Berl. Gesell. naturf. Freunde* iv. 42, *et gallice in Journ. de Physique*, xxiv. 258).—De Confervis palustribus oculo nudo invisibilibus (*Nov. Act. Acad. Petropolit.* 1785, iii. 89).—Strandparleband (Fragilaria lineata) och Armbandet (Echinella stipitata) twanne microskopiska Strandwarter (*Svensk Vetensk. Acad. Handl.* 1783, p. 80).

Naccari, F. L., Flora Veneta. Venezia, 1826–1828. 4to. 6 vols. — Algologia Adriatica. Bologna, 1828. 4to.

Nageli, K., Botanische Beiträge (*Linnæa*, 1842, xvi. pp. 237–285).— Die neuen Algensysteme und Versuch zur Begrundung eines eignen Systems der Algen und Florideen. Zurich, 1847. 4to.

Nardo. Delle Alghe e dei loro usi. Venezia, 1835. 8vo.—Observationes variæ (*in Isis*, 1834, vi. et vii. pp. 669–678).

Nees Von Esenbeck, C. G., Die Algen des süssen Wassers nach ihren Entwickelungsstufen dargestellt. Würzburg, 1814. 8vo.— Ueber den rothen Schnee (*Rob. Brown, Verm. Schrift.* pp. 343–356 in not.)

Neill, P., Edinburgh Encyclopædia. Art. 'Fuci,' x. pp. 1–23).

Nicolucci. De quibusdam Algis aquæ dulcis Neapoli, 1843. 8vo.

Nitzsch. Beitrag zur Infusorienkunde. Halle, 1817. 8vo.

Notaris, J. De, Algologiæ maris Ligustici specimen. Taurin, 1842. 4to. *Cfr. Moris.*

Oerstedt. De regionibus marinis. Havinæ, 1844. 8vo.

Olafsen, E. et Povelsen, B., Physik og œconomisk Beskrivelse over Island. Kiöbenh. 1772. 4to. 2 vols.

Olivi, G., Lamarkia, Novum Plantarum Cryptogamarum Genus (*Zoologia Adriatica*, p. 355, et *Usteri Annal.* vii. p. 76). — Delle Conferve irritabili, e del loro movimento di progressione verso la luce (*Mem. di Matem. e fis. della Società Italiana. Verona*, 1792, t. vi. pp. 161–204).—Memoria sopra una Nuova Spezie di Ulva delle Lagune Venete (*Saggi dell' Academ. di Padova*, iii. 1, p. 144).

Orbigny, Ch. D', Essai sur les Plantes marines des Côtes du Golfe de Gascogne, et particulièrement sur celles du Département de la Charente-inférieure (*Annal. Gen. Sc. Phys.* 1820, vii. pp. 161–167). —Dictionnaire Universel d'Histoire Naturelle. Paris, 1841. 8vo. Vols. 1, 2 (*Vide* Brebisson, Dujardin, Gervais, et Montagne).

Parkinson, J., Theatrum Botanicum. London, 1640. Fol.

Pauli Biarno, Specimen Observationum circa Plantarum quarundam maris Islandici et speciatim Algæ sacchariferæ dictæ originem, partes et usus. Hafniæ, 1749. 4to.

Payen. Propriétés physiques et Composition élémentaire du Tissu de Cryptogames (*Nouv. Annal. Sc. Nat.* 1840, xiv. pp. 165–167).

Peschier. Note sur la Neige rouge des Alpes (*Biblioth. Univers.* 1824, Octob. p. 132).

Petiver, J., Gazophylacium naturæ et artis. Lond. 1702. Fol. (Opp. ed. Lond. 1767. Vols. 1, 2).

Peyssonel, J. A., Observations on the Alga marina latifolia (*Philosoph. Transact.* iv. p. 631).

Philippi, Dr., Beweiss dass die Nulliporen Pflanzen sind (*Wiegmann's Archiv.* 1837, pp. 387–393, t. 9, f. 6–8).

Plukenet, L., Phytographia sive Stirpium illustrium et minus cognitarum icones. Londini, 1691–1696. 4to.

Poiret. Encyclopédie méthodique. Botanique, vol. viii. Paris, 1808. 4to, (*de Ulvis et Fucis*).

Pollini, C., Sulle Alghe delle terme Euganee, 1817. 8vo. — Flora Veronensis. Veron. 1822. 8vo.

Pomel. Bemerkungen über den Nostoch (*Leipz. Magaz.* 1783, p. 473).

Postels, Alex. et Rupprecht, Franc, Illustrationes Algarum in Itinere circa Orbem jussu Imperatoris Nicolai I. atque auspiciis Navarchi Frederici Lütke annis 1826, 1827, 1828, et 1829 veloce Seniavin exsecuto, in Oceano Pacifico, imprimis septemtrionali, ad littora Rossica, Asiatico-Americana collectarum. Petropoli, 1842. fol. max. (*Russ. et Lat.* p. 24, c. tabb. 40).

Prevost, Const., Sur une nouvelle Gyrogonite; très abondante dans les Meulières d'Eau douce des Environs de Paris (*Nouv. Bullet. de la Soc. Philomat.* Decemb. 1826).

Priestley, J., Experiments and Observations relating to various Branches of Natural Philosophy. London, 1799. 8vo. 1 vol. et Birmingh. 1781. 8vo. 2 vols.

Pylaie, De la, Quelques Observations sur les Productions de Terre-Neuve, et sur

quelques Algues de la Côte de France, appartenant au Genre Laminaire (*Annal. Sc. Nat.* 1825, iv. pp. 174–185, tom. 9).—Examen de la Question de savoir si les Cristatelles ou Éponges d'Eau douce sont des Végétaux (*Annal. Soc. Linn. de Paris*, 1827, v. pp. 407–413).—Flore de Terre-Neuve et des Iles St. Pierre et Miclon. Paris, 1829. 4to.

RABENHORST, L., Die Charen der Niederlausitz, und eine neue Art derselben (*Flora*, 1837, i. pp. 129–132, tab. 2).—Deutschlands Kryptogamenflora : Algen. Leipzig, 1847. 8vo.

RADDI. Crittogame Brasiliane (*Mem. di Matematica e di Fisica dell Società Italiana resid. in Modena*, xix. et xx.)

RAFINESQUE-SCHMALZ. Ecpexis, nov. gen. of Water-Plants (*Atlantic Journ.* i. p. 200).

RAJUS, T., Synopsis Methodica Stirpium Britannicàrum. Ed. tertia. Londini, 1742. 8vo.—Historia Plantarum. 3 vols. Londini, 1685. Fol.

RASPAIL. Expériences chimiques et physiologiques sur les Chara (*Soc. Hist. Nat. et Philomat. de Paris*, séanc. de 11 et 15 Août, 1827). — Ueber die Conferven-Abdrücke in den Moosachaten und Chalcedonen (*Ann. des Sc. d'Observ.* vol. iii. Nr. 2, Febr. 1830).

REAUMUR, R. A. F., Descriptions de Fleurs et de Graines de divers Fucus, et quelques autres Observations physiques sur ces même Plantes (*Mém. de l'Acad. de Sc. de Paris*, 1711, p. 381, et 1712, p. 21).—Observations sur la Végétation du Nostoch (*Ibid.* 1722, p. 161).

REICHENBACH, L., Iconographia Botanica seu Plantæ criticæ. Cent. viii. 791–800.

RETZII, A. T., Floræ Scandinaviæ Prodromus. Lipsiæ, 1795. 8vo.

RICHARD, ACHILL, Voyage de l'Astrolabe. Essai d'une Flore de la Nouvelle-Zélande. Paris, 1832. 8vo. et Sertum Astrolabii. Paris, 1834. 8vo. c. tabb. in fol.—Varia in *Dict. Class. d'Histoire Naturelle*, sub vocibus : Thalassiophytes, xvi. 204.—Végétaux, xvi. 513.

ROBERG. Vid. Algues de la Normandie, par Roberg et Chauvin.

ROEMER, T. T., Archiv für die Botanik. 3 B. Leipzig, 1796–1805. 4to.—Die Algen Deutschlands. Hanover, 1845. 4to.

ROMAIN et COQUEBERT. Observations sur une Espèce de Conferve peu connue (Conferva jugalis, Fl. Dan.) (*Bull. Philom.* v. i. p. 69).

ROTH, A. W., Tentamen Floræ Germanicæ. V. i.–iii. Lipsiæ, 1788–1800. 8vo. Bemerkungen über das Studium der kryptogamischen Wassergewächse. Hanover, 1797. 8vo.—Catalecta Botanica, V. i.–iii. Lipsiæ, 1797–1806. 8vo. — Neue Beiträge zur Botanik. 1. Th. Frankfurt a. M. 1802. 8vo.—Bemerkungen über den inneren Bau der Conferven und ihre Vermehrungsart (*Schrad. Journ.* 1 B. 1800, p. 62).—De Confervis verticillatis (*Ibid.* 1 B. 1800, p. 331).—Botanische Bemerkungen und Berichtigungen. Leipzig, 1807. 8vo.—Observations on the Rivulariæ and the Genera related to them. From the German (*König, Annal. of Botany*, i. p. 247).

ROUSSEL, H. F. A. DE, Flore du Calvados et Terrains adjacens. Caen, 1696. 8vo.

RUCHINGER. Flora dei lidi Veneti. Venezia, 1818. 8vo.

RUDOLPHI, F., Bemerkungen über Conferva ægogropila (*Flora*, 1827, i. pp. 180–186).—Einige Bemerkungen zu den kritischen Beiträgen zum Studio der Süsswasseralgen in Flora, 1827, Nr. 54, pp. 705–730 (*Flora*, 1829, i. pp. 353–368). — Ueber die Ursache der Bewegung kleiner Körper (*Flora*, 1830, i. p. 1).—Algæ Ecklonianæ (*Linnæa*, 1831, vi. p. 171).

RUIZ, H., De vera Fuci Natantis Fructificatione Commentarius. Madriti, 1798. 8vo.

RUPPRECHT, FRANC, Illustrationes Algarum Oceani Pacifici. Petrop. 1842. Fol. *Vide* POSTELS, ALEX.

RUSSEL, P., Dissertation concerning the Use of Sea-water in the Diseases of the Glands. London, 1760. 8vo.

SAUSSURE, H. B. DE, De deux nouvelles Espèces de Tremelles, données d'un Mouvement spontanée (*Journ. de Phys.* 1790, xxxvii. p. 401).

SCHADE, C., Beskrivelse over Morsland. Aalborg, 1811. 8vo.

SCHERER, J. A., Observationes et Experimenta super Materia viridi Thermarum Carolinarum et Toeplitzensium regni Bohemiæ (*Jacq. Coll.* vol. i. p. 177). — *Germ. in Abhandl. d. Boehm. Gesellsch.* 1786, p. 254).

SCHLEIDEN. Botanische Notizen. Krystalle in Cryptogamen.— Ueber das Zerfallen der Conferven in ihre einzelnen Glieder (*Wiegm. Archiv.* 1839, i. p. 64 et 268).

SCHMIDEL, C. C., Descriptio Itineris per Helvetiam, Galliam et Germaniæ partem, anno 1773–1774 instituti. Erlang. 1794. 4to.

SCHRADER'S Journal für Botanik. Göttingen, 1799–1809. 8vo.

SCHRANK, FR. DE PAULA, Beschreibung einer Wasserseide (*Von Molls, Oberdeutsche Beiträge*, p. 133).—Ueber die grüne Materie der Aufgüsse (*Usteri Annal.* 9 St. p. 1).—Ueber die Oscillatorien, *N. A. N. C.* 1823, xi. 2, p. 523–540).

SCHREBER, T. C. D., Specilegium Floræ Lipsicæ. Lipsiæ, 1781. 8vo.

SCHÜBLER, Prof., Hydrurus crystallophorus, eine neue Süsswasseralge Deutsch-

lands (*Flora*, 1828, i. pp. 66–80, cum tab.).—Nachschrift zur obigen Abhandlung (*Ibid.* 143–144). — Nachträgliche Bemerkungen über Hydrurus crystallophorus (*Ibid.* 1828, ii. pp. 577–587).

Schumacher, C. F., Enumeratio Plantarum in partibus Seelandiæ septemtrionalis et orientalis. Partes 2. Hafniæ, 1801–1803. 8vo.

Schwabe, H., Anhaltia Fridericæ, eine neue Algengattung (*Linn.* 1834, ix. pp. 127, 128, c. ic.).—Ueber die Algen der Karlsbader warmen Quellen, 1 (*Linn.* 1837, xi. pp. 109–117, c. tabb. 2).

Seba, A., Locupletissimi rerum naturalium Thesauri accurata Descriptio et Iconibus artificiosissimis expressio per universam Physices Historiam. Vol. i.–iv. Amstelodami, 1734–1765, fol.

Secondat, Une Espèce d'Ulva, qui croit dans la Fontaine bouillant de Dais. *Observ. de Phys. et d'Hist. Nat.* p. 12). Paris, 1750.

Seetzen, U. T., Gedanken über den Ursprung der Tremella Nostoch, oder über die sogenannten Sternschnuppen (*Lichtenbergs und Voigts Mag.* xi. *B.* 1796, p. 158).

Sennebier, T., Sur la Matière verte, ou plutôt sur l'Espèce de Conferve, qui croit dans les Vaisseaux plein d'Eau exposés à l'Air (*Journ. de Phys.* t. xvii. p. 209.—*Vide* etiam *Voigts Mag.* ii. B. 1800, p. 762).

Serres, Hect., Description d'une Espèce de Chara (*Act. Soc. Linn. de Bordeaux*, 1836, vii. pp. 31, 52, c. ic.).

Shuttleworth, On the Colouring Matter of Red Snow (*Edinb. New Philosoph. Journ.* 1840, *Juli* p. 54. *Biblioth. Univ. de Génève*, 1840, p. 405).

Sibbaldi, R., Scotia illustrata, sive Prodromus Historiæ Naturalis, etc., Edinb. 1694, fol.

Slack, H., Exposition de Tissus élémentaires avec quelques Exemples de Circulation végétale (*Nouv. Ann. Sc. Nat. V.* i. pp. 193–202; 271–282).

Smith, C., Nogle Reise-Jagttagelser isaer over Jisfieldene (Gletschere) paa en Fjeldreise i Norge, 1812 (*i Topographisk-Statist. Samlinger*, 2 *Deels*, ii. B. Christiania, 1817, pp. 1–62).

Smith, T. E., English Botany, or Coloured Figures of British Plants, with their essential Characters, Synonyms, and Places of Growth, with occasional Remarks. The Figures by Sowerby. London, 1790. seqq. 8vo.

Smith, Wm., A Synopsis of the British Diatomaceæ. London, 2 vols. 1853–1856. Roy. 8vo.

Sommerfelt, I. C., De Nive rubra s. Sphærella nivali (Dan. in *Magazin for Naturvidenskab*, 1824, iv. p. 249).

Sowerby. *Vide* Smith, T. E., et Turner, Daws.

Sprengel, C., Epistola ad Willdenowium de Fucis quibusdam et Confervis Maris Mediterranei (*Berl. Mag. 3. Jahrg.* 4to. p. 186).—Historia rei herbariæ, v. 1–11. Amstelodami, 1807 et 1808, 8vo.—Systema Vegetabilium (*Syst. Veg. Car. Linn.* ed. xvi.). Vol. iv. Göttingæ, 1827. 8vo.

Springsfeld, Observations sur une Plante, qui croit aux Environs des Eaux chaudes de Carlsbad en Bohéme, nommée Tremella thermalis, gelatinosa, reticulata, substantia vesiculosa (*Hist. de l'Acad. de Berl.* 1752, v. 8, p. 102).

Stackhouse, J., Nereis Britannica, sive Fuci, Ulvæ et Confervæ in Insulis Britannicis crescentes, Descriptione Latina et Anglica, nec non Iconibus ad vivum depictis illustrati. Edit. prima. Bathoniæ, 1801, fol.—Edit. altera. Oxonii, 1816, 4to. — Description of the Ulva punctata (*Linn. Transact.* 1797, iii. pp. 236, 237). — Tentamen marino-cryptogamicum (*Mem. Soc. Nat. Mosqu.* 1809, ii. pp. 50–97).

Starcke, Ueber Byssus Jolithus L. (*Schrad. Journ.* i. B. 1800, p. 340; et *König Annal. of Botany*, i. p. 283).

Steinheil, Ad., Matériaux pour servir à la Flore de Barbarie, ii. Article, Notice sur les Cryptogames recueillies aux Environs de Bone (*Ann. Sc. Nat.* 1834, i. pp. 282–289).

Stephenson, M., De i. Island til Menneskeföde brugelige Tangarter *Kongel* (*Danske Landhunsholdnings Selskabs Skrifter nye Samling*, i. B. Kbhn. 1808, p. 487).

Sternberg, Graf C. Versuch einer geognostisch botanischen Darstellung der Flora der Vorwelt. 5. u. 6. Heft. Mit 20 Kupfert. Prag, 1833, fol.

Stiebel, Dr., Ueber den Bau und das Leben der grünen Oscillatorie (Lysigonium tænioides), (*Mus. Senkenb.* iii. pp. 79–90, t. 5).

Strange. Lettera sopra l'Origine della carta naturale di Cartona. Pisa, 1764. 4to.

Ström, H., Physisk og œconomisk Beskrivelse over Fogderiet Söndmöer. 2 Dele. Soröe og Kbhn. 1762–1766, 4to. —Beskrivelse over Norske Söe. Vaexter. Kiöbenh. (*Vedensk Selsk. Sk.* 10. *Deel.* p. 249).—Anmerkninger til Söndmörs Beskrivelse (*Kongl. Norske vidensk. Selsk. Nye Saml.* i. B. Kbhn. 1784, 4to, p. 203).—Fortegenelse over Norske Söevæxter (*Ibid.* ii. B. Kbhn. 1788, p. 347).

Suhr, J. N. De., Beiträge zur Algenkunde (*Flora*, 1836, n. 22, p. 337. *Vers. Gall. Nouv. Annal. Sc. Nat.* 1837, ii. pp. 171–176).—Ueber die Fructification

der Hutchinsien Ag. (*Flora*, 1831, ii. pp. 721–724).—Beschreibungen neuer Algen (*Flora*, 1831, ii. pp. 673–687; 709–716; 726–731). (*Flora*, 1834, i. pp. 209–211).—Uebersicht der Algen, welche von Hrn. Ecklon an der südafricanischen Küste gefunden worden sind (*Flora*, 1834, ii. pp. 721–735; 737–743. Tab. i. ii.).

Svensk, Botanik of Palmstruch och Swartz. Andra upplagan. Stockh. 1803, seqq.

Tabernaemontani, J. T., Icones Plantarum seu Stirpium, curante Nic. Bassæo Typographo. Francof. a. M. 1590, 4to., oblong.

Targioni-Tozetti, J., Catalogus Vegetabilium marinorum Musei mei. Opus posthumum ad secundam Partem novorum Generum Plantarum celeberrimi P. A. Micheli inserviens, cum notis Octaviani Targioni Tozetti J., filii. Florentiæ, 1826, fol.

Taylor, R. C., A Description of a Fossil Vegetable of the Family Fucoides in the Transition Rocks of North America, and some Considerations in Geology connected with it (*Mag. of Nat. Hist. conducted by Loudon.* Vol. vii. (1834), pp. 27–32).

Tenore, M., Su la Voce Ulva e sul Papiro *Linnæa.* Vol. x. p. 128).

Thienemann, L., Ueber ein neues Geschlecht v. Schneepflanzen, Chionyphe, Schneegewebe (*N. A. N. C.* vol. xix. P. i. (1839), p 19–26. Tab. ii.).

Thompson, W., Abstract of a Paper on Irish Algæ, read before the Natural History Society of Belfast, on Jan. 20, 1836 (*Mag. of Nat. Hist. conducted by Loudon.* vol. ix. (1836), pp. 147–151. —On a Minute Alga which colours Ballydrain Lake, in the County of Antrim (*Ann. of Nat. Hist.* vol. i. (1838), pp. 1–6).

Thore, T., De Conferva Hispida (*Mag. Encyclop.* an. v. p. 398).—Essai d'une Chloris du Département des Landes. Dax, 1803. 8vo.

Threede, Nordsee-Algen, 1 Centurie. Hamburg bei Hoffmann und Campe.

Thuret, G., Note sur l'Anthère du Chara et les Animalcules qu'elle renferme (*Nouv. Ann. Sc. Nat.*, tom. xiv. (1840) pp. 65–72).

Tommasini, M., u. Biasoletto, B., Streifzug von Triest nach Istrien im Frühlinge 1833, mit besonderer Rücksicht au. Botanik (*Linn.* vol. xi. 1836, pp. 433–483. Mit 2 Taf.).

Tonring, H., Rariora Norvegiæ (*Amœn. Acad.* vol. vii. p. 470).

Tournefort, J. P., Histoire de Plantes. Ed. alt. Paris, 1725, 8vo.—Institutiones rei herbariæ. vol. i.–iii. Parisiis, 1719. 4to.

Trentepohl, J. F., Anmerkungen über einige in den ersten Heften der Flora Danica abgebildete Pflanzen (*Roth botanische Bemerkungen und Berichtigungen*, p. 52).—Beobachtungen über die Fortpflanzung der Ectospermen des Herrn Vaucher, etc. (*Ibid.* p. 189).

Treviranus, G. R., Biologie oder Philosophie der lebenden Natur, für Naturforscher und Aerzte. 4 Theile. Göttingen, 1802–1814. 8vo.

Treviranus, L. C., Von dem Bau der kryptogamischen Wassergewächse (*Weber und Mohrs Beitr. zur Naturk*, i. B. p. 163).—Beobachtungen über die Bewegung des körnigen Wesens in einigen Conferven und einer Chara (*Ibid.* ii. B. p. 142).—Fernere Beobachtungen über die Bewegung der grünen Materie im Pflanzenreiche (*Trev. Verm. Schrift.* B. ii. pp. 71–92).—Ueber die Oberhaut der Gewächse (*Ibid.* B. iv. pp. 3–80).

Trevisan, Vict., Prospetto della Flora Euganea. Padova, 1842, 8vo.

Turner, Dawson, Synopsis of the British Fuci. Vol. i. ii., 1802, 12mo.—Historia Fucorum. Lond. vols. i.–iv., 1807, seqq. 4to.—De Ulva furcellata et multifida (*Schrad. Journ.* i. B. 1800, p. 300).—Calendarium Plantarum marinarum (*Linn. Transact.* vol. v. p. 126–131).—T. et Sowerby, Catalogue of some of the more rare Plants observed in a Tour through the western Counties of England, in June, 1799 (*Ibid.* vol. v. pp. 234–241).—Description of four new Species of Fuci (*Ibid.* vol. vi. p. 125). —Remarks upon the Dillenian Herbarium (*Ibid.* vol. vii. pp. 101–115).—Account of a new interesting Species of Fucus (*König, Annal. of Botany*, ii. 366).

Turpin, P. J. F., Observations sur quelques Productions marines, qui avaient été considérées les unes, comme des Animalcules isolés; les autres, comme des agrégations filamenteuses d'animalcules analogues aux premiers (*Mém. du Mus. d'Hist. Nat.* vols. v. xv. p. 299).—Organographie végétale (*Ibid.* vol. xiv., 1827, p. 15, pl. 3–5; vol. xvi., 1828, p. 48, pl. 10, 11).—Aperçu organographique sur le Nombre Deux (*Ibid.* vol. xvi., 1828, p. 295, pl. 13).—Note ajoutée au Mémoire de Cogniard-Latour (*Nouv. Annal. Sc. Nat.* tom. iv. 1835, pp. 35–41, *avec une Planche*).—Note ajoutée aux Observations de M. de Brebisson (*Nouv. Ann. Sc. Nat.* tom. vi. 1836, pp. 251–253).

Unger, Fr., Die Metamorphose der Ectosperma clavata Vauch. (*Nov. A. N. C.* 1827, xiii. 2, pp. 786–808, t. 40; *Annal. Sc. Nat.* xiii. pp. 428–444).—Algologische Beobachtungen (*Nov. A. N. C.* xvi.

2, pp. 521–542, t. 39).—Mikroskopische Beobachtungen über die Oscillatoria labyrinthiformis (*Nov. A. N. C.* xviii. 2, pp. 705–710, t. 5; *Nouv. Annal. Sc. Nat.* xi. pp. 253–255).—Ueber den unmittelbaren Uebergang des sprossenden vegetativen Lebens in das bewegte infusorielle und umgekehrt, und zunächst über die Metamorphose der Ectosperma clavata (*Flora*, 1830, ii. pp. 569–583).—Ueber den rothen und grünen Schnee (*Flora*, 1832, i. p. 144).—Die Pflanze im Momente der Thierwerdung. Wien, 1843. 8vo, c. ic.

Usteri, P., Annalen der Botanik, 1–18. Stück. Zürich, 1791–1796. 8vo.

Vahl, M., Endeel Cryptogiske Planter (Fuci) fra St. Croix (*Naturhist. Selsk. Sk.* 5, B. ii.; Heft. Kbhn, 1802. 8vo, p. 29).

Vaillant, S., Botanicon Parisiense, ou dénombrement par Ordre alphabétique des Plantes qui se trouvent aux environs de Paris. Leide et Amsterdam, 1726. Fol.

Valentin, Dr., Ueber die Spiralbewegung der Vaucheria. Berichtigung (*Linnæa*, vol. x., 1835 et 36, pp. 122–123).—Repertorium für Anatomie und Physiologie. Bd. i. Hft. i. u. 2. 8vo (Hygrocrocis intestinalis).

Vandelli, Dom., Dissertatio de aponensibus thermis. Patavii, 1758. 4to.

Varley, C., Ueber Samen, Keimung und Saft-Circulation der Chara vulgaris nebst anderen Bemerkungen (*Transact. of the Soc. of Arts, Manuf. Comm. &c.*, vol. xlviii. Lond. 1832. *Im Auszuge mitgetheilt von Beilschmied in Flora*, 1834; i. Beibl. pp. 61–75).

Vaucher, J. P., Histoire des Conferves d'eau douce, contenant leurs différens Modes de Réproduction, et la Déscription de leurs principales Espèces, etc. à Génève, 1803. 4to.—Mémoires sur les Graines des Conferves. Paris, 1800. 4to (*et Bull. Philom.* an. ix. p. 185, *et in Journ. de Phys.* 1801, vol. lii. p. 344).—Mémoire sur les Charagnes (*Mém. de la Soc. de Phys. et d'Hist. Nat. de Génève*, tom. i., 1820, pl. 1, pp. 168, 169, avec une Planche).

Velley, T., Coloured Figures of Marine Plants, found on the Southern Coast of England, etc. Bathoniæ, 1795. fol.—Remarks on the Nature and Propagation of Marine Plants (*Linn. Transact.* vol. v. pp. 145–158).—Additional Note to the Remarks on the Nature and Propagations of Marine Plants (*Ibid.* vol. v. p. 274). Description of Conferva umbilicata, a new plant, from New South Wales (*Ibid.* vol. v. p. 169, tab. 7).

Vernisy, Mémoire sur le Nostoch (*Nouv. Mém. de l'Acad. de Dijon*, 1784, p. 13).

Vilcke, J. C., Orn en liten Vaxt, som vaxer uti Driksglass och Halles for en Sertularia eller Conferva (Conferva stellaris; *Act. Holm.* 1764, vol. xxv. p. 264.)

Vogel, J. R. Th., Bemerkungen über das Vorkommen des Amylum bei den Kryptogamen (*Linnæa*, vol. xv., 1841, pp. 59–65).

Voith, Von, Ueber Tremella Nostoc (*Flora*, 1825, ii. pp. 682–688; und 1828, ii. p. 662).

Wahlenberg, G., Flora Lapponica, exhibens plantas geographice et botanice consideratas in Lapponiis suecicis. Berolini, 1812. 8vo.

Wallace, J., An Account of the Islands of Orkney. London. 1700. 8vo.

Wallroth, Flora Cryptogamica Germaniæ. Norimb. 1831 et 1833. 12mo.

Ward, F. L. S., Bericht über Laminaria digitata in der Linnæan Society (*Philos. Mag. and Journ. of Sc.* vol. xii. 1838, p. 96.

Watson, *Vide* Dixon.

Weber, F. und Mohr, D. M. H., Grossbritanniens Conferven; nach Dillwyn für deutsche Botaniker bearbeitet. Götting. 1803–1805. 8vo.—Beiträge zur Naturkunde, 1 Theil. Kiel 1801. 2 Theil. 1810. 8vo.—Archiv für systematische Naturgeschichte. 1 Hft. Lpz. 1804. 8vo.—Naturhistorische Reisen durch einen Theil Schwedens. Götting. 1804. 8vo.

Weigel, C., Observationes Botanicæ. Gryphiæ, 1772. 4to.

Weiss, F. G., Plantæ Cryptogamicæ Floræ Goettingensis. Götting. 1770. 8vo.

Welwitsch, Fried., Synopsis Nostochinearum Austriæ inferioris. Wien, 1836. 8vo.

Whitaker, J. S., Notice of the Fucus natans. Lewes, 1830. 8vo.

Wiegmann, A. F., Ueber die Bildung der Pristley'schen Materie und ihren Nutzen zur Erzeugung kryptogamischer Gewächse (*Arch. des Apotheker-Vereins*, 1822, nr. 3, p. 155).

Wiggers, F. H., Primitiæ Floræ Holsatiæ. Kiloniæ, 1780. 8vo.

Willan. Confervæ Species (Byssus lanuginosa) in aquis sulphureis Croft prope Darlington. In ejus Observationes, etc. London, 1782. 8vo. pp. 9, 10.

Withering, W., An Arrangement of British Plants, according to the latest improvements of the Linnæan System. Sixth edition. Lond. 1818, vol. iv. 8vo.

Woodward, J. T., The History and Description of a new Species of Fucus (*Linn. Transact.* i. p. 131).—Description of two new British Fuci (*Ibid.* ii. p. 29, et p. 321, t. 6, 7).—Description of Fucus dasyphyllus (*Ibid.* ii. p. 259,

t. 23).—Additional Observations on Fucus Hypoglossum (*Ibid.* vol. ii. p. 321).—Observations upon the generic character of Ulva, with descriptions of some New Species (*Ibid.* iii. p. 46, *et in Schrad. Journ.* 1 B. p. 128).

Wrangel, F. A., Mémoire pour servir à l'Histoire botanique du Byssus flos aquæ, L. (*Kongl. Vetenskaps. Acad. Handl.* 1821, i. p. 96.)—Microscopiska och Physiologiska undersökningar röranda utrecklingen of Lepraria kermesina och dess likhet med den sa kallade röda snön. Tillägg tik Anmärkningarne rörande Byssus Jolithus, L. (*Ibid.* 1523, p. 71).

Wulfen, X., Cryptogamia Aquatica. Lips. 1803. 4to (*et in Römer's Arch. für die Bot.* 3 B. p. 1.)—Plantæ rariores carinthiacæ (*Jacq. Coll.* vol. i. p. 351; vol. iii. p. 146; vol. iv. p. 342).

Wyatt, M., Algæ Danmonienses. Torquay, vols. i.–iv.

Zanardini, G., Lettera intorno ad alcune nuove Specie di Alghe (*Biblioth. Italiana*, 1839, xcvi. pp. 131–137.)—Sopra le Alghe del Mare Adriatico lettera seconda (*Ibid.* xcix. p. 2.)—Synopsis Algarum in Mari Adriatico hucusque collectarum, cui accedunt Monographiæ Siphonearum, nec non generales de Algarum vita et structura disquisitiones, cum tabulis auctoris manu ad vivum depictis. Taurini, ex typogr. reg. 1841. 4to, cum tab. 8 (*ex Act. Acad. Taurin. Class. Matem. e fis.* 2 Ser. t. iv. seorsim impress.).—Sulle Corallinee (Polipaj calciferi di Lamouroux) revista. Venezia, 1844. 8vo.—Saggio di Classificazione naturale delle Ficee. Venezia, 1843. 4to.

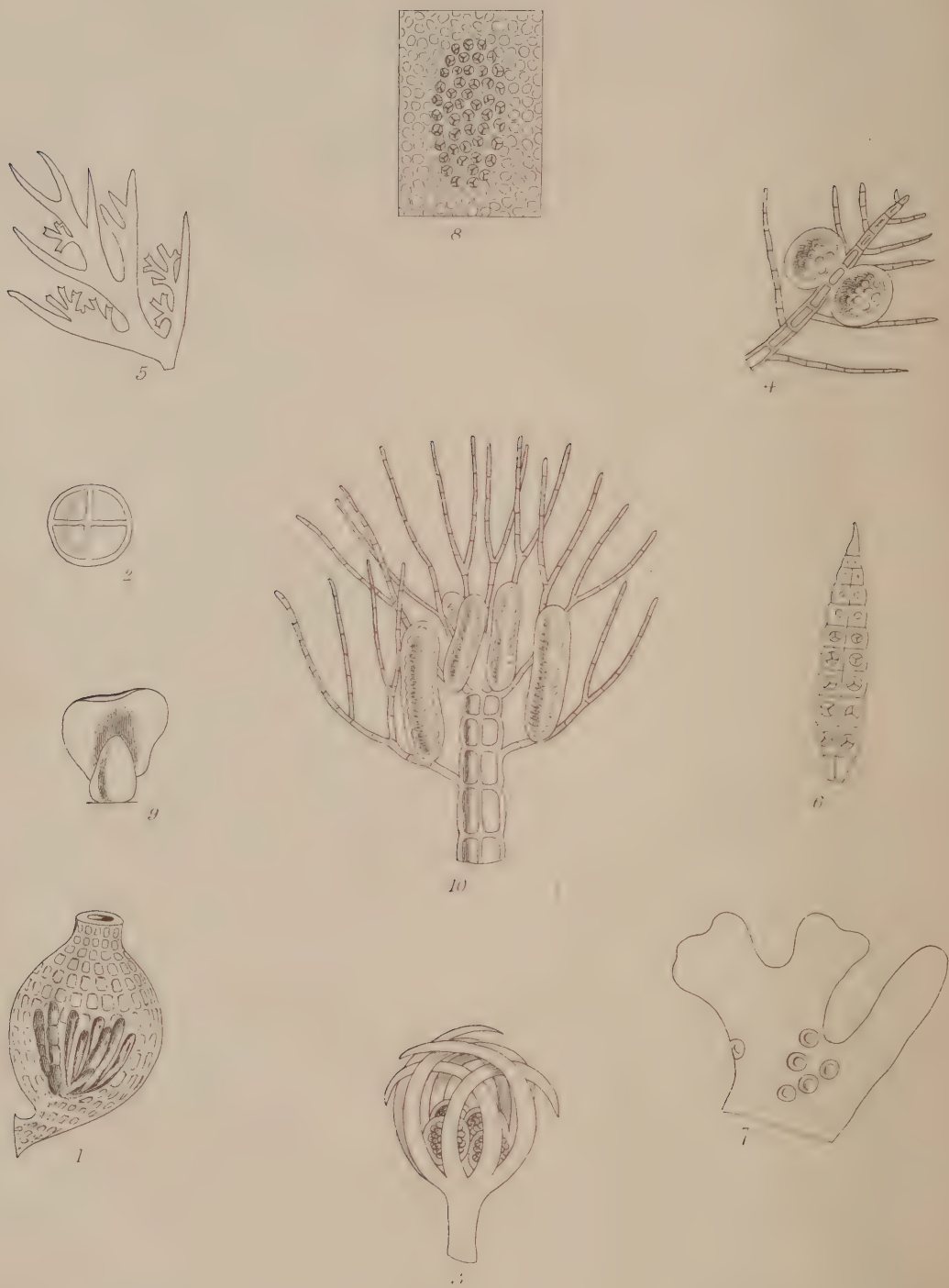
Zannichelli. De Myriophyllo pelagico et marina Plantula anonyma. Venetiis, 1714. 8vo.

Zenker, J. C., Oscillatoria tapetiformis (*Linnæa*, vol. ix., 1834, pp. 125–126, *Mit Abbild.*)

Zigno. Sopra alcuni Corpi organici nelle infusioni. Padova, 1839. 8vo.

Zoega, J., Flora Islandica (juxta plantas in Islandia a J. G. König lectas elaborata), impressa ad finem E. Olavsens et Povelsens Reise igjennem Island. Soröe 1772, 4to, et cum eodem libro germanice verso Kopenhagen und Leipzig. 1775. 4to.

Several Periodicals may be consulted, containing stray articles, such as *Edinburgh Philosophical Magazine*, *Annals of Natural History*, *Phytologist*, *Microscopical Journal*, *Transactions and Proceedings of the Edinburgh Botanical Society*, *Irish Natural History Review*, and many others so well known as not to require naming.



FIGURES ILLUSTRATIVE OF THE FRUCTIFICATION OF ALGÆ.

1. Capsule or Ceramidium. 4. Bilobed favellæ. 8. Sorus.
2. A Tetraspore. 5 & 6 Stichidia. 9. Nemathecium or W
3. Favellæ Involucre 7. Imbedded tubercles or coccidia. 10. Antheridia.

GLOSSARY OF BOTANICAL TERMS.

Abnormal—contrary to the regular order of growth.
Abortive—not reaching perfection.
Accessory (ramuli)—branchlets differing from the ordinary ones, and for a special purpose.
Acotyledonous (plants)—plants which are propagated by spores (*Cryptogamia*).
Acrogenous—growing from the top.
Aculeated—with a point like a prickle.
Acuminated—with a long, slender, sharp point.
Adnate—adhering to an object by the whole surface.
Agglutinated—glued together.
Aggregate—grouped, or collected together.
Air-vessel—a hollow portion of the frond filled with air.
Amorphous—without any regularity in shape.
Analogue, *Analogous*—when a plant of one genus strikingly resembles that of another, so as to represent it, it may be said to be the *analogue* of that plant.
Anastomose—to grow into and unite with another body.
Annular, *Annulated*—ringed, formed into rings.
Antharedia—reproductive organs, but their nature not well understood, as in *Polysiphonia fibrata*. See plate, fig. 10.
Apex (pl. *apices*)—the top of anything.
Apical—belonging to the apex or top.
Appositional (branches)—two branches lying together, and partly uniting, so as to appear like a compound branch.
Appressed—closely approximated, or in branching when the smaller lie close to the larger standing very *erect*.
Areolated, *Areola* (pl. *areolæ*)—marked out into regular spaces like a pavement.
Articulated—possessing a jointed appearance.
Articulation—in all fronds consisting of a single string of cells, each cell is an articulation; literally, a joint.
Axil—the angle formed by the junction of the branch and stem.
Axis—central portion of the frond.

Basal—belonging to the base.
Base—the bottom of anything.
Bifid—cleft into two segments.
Bilobed—divided into two lobes.
Branchlet—the ultimate division of a compound frond.
Bullated, *blistered*—having a blistered appearance.
Byssoid—forming tufts of slender filaments.

Cæspitose—growing in tufts or patches.
Calcareous—containing lime.
Calli—hard parts.
Capillary—slender, hair like.
Capitate—terminating in a knob.
Capitulum—a terminal knob.
Capsule or *Ceramidium*—pitcher-shaped bodies containing spores, sporules, or seeds, as in *Polysiphonia urceolata*. See plate, fig. 1.
Carnose—having a fleshy consistence.
Carpoclonium—a receptacle of spores found in certain Algæ.
Cartilaginous—gristly.
Caulescent—having a stem.
Caulonia—the stem-like portion of the thallus of *Fuci*, and such like.
Cell—on examining a portion of a plant (best done under the microscope) it will be found to be made up of minute membranous sacs (or cells); in the aggregate, cellular tissue.
Cellular (structure)—when the cells are arranged like a honeycomb, or without any obvious arrangement.
Cellulose—the substance composing the walls of the cells.

Ceramidium — an ovate conceptacle, pierced by a terminal pore, containing a tuft of spores rising from the base of the conceptacle. See *Capsule.*

Chlorophyll—green matter found in the cells of plants.

Cilia—bodies like eye-lashes with which the spores of many of the Algæ are clothed, and which causes the peculiar animal-like motions to certain species.

Cinereous—ash-coloured.

Cirrhose—having tendrils like a vine.

Class—a primary division of the vegetable kingdom, consisting of orders, orders of genera, genera of species.

Clavate—club-shaped.

Coccidium—a conceptacle (spherical or hemispherical shaped) without a pore, containing a tuft of spores on a central placenta. See *Tubercle.*

Compressed—laterally flattened.

Concentric—having a common centre.

Conceptacle—a hollow case containing tufts or clusters of spores.

Confervoid—resembling a *Conferva:* a tribe of plants formed of single threads, which are again formed of continuous single cells.

Coniocystæ—the name of the fruit of the genus *Vaucheria*, *Codium*, &c.

Constricted—as if tied by a string passed round, partly or wholly closing the circle.

Continuous—without stop or hindrance, internal or external.

Convolute—rolled together.

Cordate—heart-shaped.

Coriaceous—leathery.

Corneous—horny.

Corymbose—branches passing off at different heights from a main stem, their tops being on a level, or forming a convex surface.

Cosmopolitan—found in most parts of the world.

Costate—ribbed.

Crenated—notched.

Cruciate—cross-shaped.

Crustaceous—hard like a crust.

Cryptogamous — plants without visible flowers.

Cuneate, *Cuneiform* } wedge-shaped.

Cuticle—the skin or outer layer.

Cylindrical—round and elongated.

Deciduous—falling off: applied to trees, &c. that cast their leaves.

Decumbent—lying on the ground.

Deflexed—bent downwards.

Denticulate—having small tooth-like processes along the margin.

Denticulated—toothed.

Diaphanous—almost transparent.

Dichotomous—branched by repeated forkings, each division continually dividing at its apex into two divisions.

Diœcious—amongst Algæ having antheridia and spores on separate plants.

Disc—applied to the surface of the frond within the margin, or to the flat base, by which many Algæ adhere to rocks and stones.

Dissepiments—the partitions of articulate Algæ.

Distichous—placed in two opposite row.

Divaricate—spreading at obtuse angles.

Ellipsoidal—nearly resembling an oval shape.

Elliptical—oval.

Embryo—the germ of the future plant contained in the seed.

Endochrome—the colouring matter contained in the cells.

Ensiform—shaped like a sword.

Epidermis—the outer coating of cellular tissue.

Epiphytic—growing on another plant, but attached to its surface only.

Erumpent—forming prominences or warts, as if bursting through the epidermis.

Falcate—sickle-shaped.

Fasciculate, *Fasciculated* } tufted, level-topped.

Fastigiate—when the branches are parallel and pointing upwards.

Favellæ—conceptacular fruit, as in *Ptilota plumosa* and *Callithamnion;* two-lobed in the latter. See plate, figs. 3 and 4.

Favellidium—a *favella* immersed in the frond.

Ferruginous—rust-coloured.

Fibro-cellular, *Fibroso-cellular* } when the cells are firm, somewhat elongate, and strung together in threads.

Filament—cells continuously placed end to end.

Filamentous—made up of threads, slender, thread-like.

Filiform—like string, thread-shaped.

Fimbriated—fringed.

Flabelliform—fan-shaped.

Flaccid—soft and bending, collapsing when removed from the water.

Flexuous—bent from side to side, wavy.

Foliiferous—leaf-bearing.

Free—standing alone.

Frond—the whole plant.

Frondlet—a little frond.

Frustules—the joints of which dichotomous plants are composed.

Fuliginous—smoke-coloured.

Fuscous—reddish-brown.
Fusiform—spindle-shaped.

Gelatinous—having the consistence of jelly.
Gelatinoso-cartilaginous — betwixt gelatinous and cartilaginous.
Gelatinoso-membranaceous — betwixt gelatinous and membranaceous.
Gemmules—buds which eventually fall off growing into new plants.
Geniculated—bent like the knee.
Genus—an assemblage of species that ought to be nearly related to each other in their fructification, and even general outward aspect.
Gibbous—the surface elevated at a particular place.
Glandular—having glands.
Glaucous—a metallic lustre of green and blue.
Gonidia—reproductive cells.
Granules—seed-like grains collected in patches called *sori*, or placed in the tips of branchlets.

Habit—the appearance as a whole which a plant has to the eye.
Habitat—the place a plant is found growing.
Hastate—spear-shaped.
Heterogeneous—possessing several natures : applied often to a confused mass.
Homogeneous—having a uniform substance, in opposition to heterogeneous.
Hyaline—almost transparent, colourless.

Imbricated—overlapping at the edge, like tiles on a roof.
Inarticulate—not jointed.
Inflated—puffed out.
Internode—an articulation ; the space between two joints of a stem.
Involucre, *Involucrate*—ramuli forming a cover to conceptacle in the shape of a whorl around it, as in *Ptilota plumosa*. See plate, fig. 3.
Involute—rolled inwards.
Iridescent—showing the colours of the rainbow, as in mother-of-pearl.

Lacinia—a narrow segment.
Laciniated—cleft more or less deeply.
Laminia—the surface of the frond.
Lanceolate—lance-shaped.
Lateral—at the sides.
Lenticular—round circumference, surface depressed above and below.
Level-topped—same as fastigiate.
Lichenoid—irregularly lobed, such as the leafy lichens.
Limbus—a border.
Linear—the same width all along.
Linguliform—tongue-shaped.
Lobe—a portion of a cut frond.
Lobule—diminutive of lobe.
Lubricous—smooth, slippery.

Mamillated—hemispherical, with a wart on its tip.
Matrix—that from which something else is formed.
Membranaceous—soft and tender, as to substance ; thin and filmy otherwise.
Metamorphosed—changed from what it once was, or used to another purpose.
Midrib—a large vein, percurrent where it continues to the end of the frond.
Mitriform—mitre-shaped.
Moniliform—like a string of beads.
Monœcious—having antheridia and spores on the same plant, but not in the same conceptacle.
Mucronate—a rounded apex with a small projecting point or spine.
Mucus—organic gelatine.
Multifid—repeatedly divided.

Nemathecium—a protuberance like a wart, as in *Phyllophora rubens*. See plate, fig. 9.
Nerve—a veinlet.
Node—a joint.
Nodose—with swollen joints.
Normal—regular, usual.

Ob—a prefix to a word signifies inversely ; as ob-cordate, the reverse of cordate ; ob-ovate, the reverse of ovate.
Oblong—greater in length than breadth.
Obovate—the reverse of ovate.
Obsolete—wearing out of sight.
Olivaceous—a dusky green, inclining to brown.
Opaque—the opposite of transparent ; cannot be seen through.
Orbicular—round.
Order—a secondary division of the vegetable kingdom containing *orders* (see *Class*).
Oval—equally rounded at both ends; the length exceeding the breadth.
Ovate—shaped like an egg.

Palmate—shaped like an open hand.
Papillated—covered with small warts—papillæ.

Paranemata — filaments accompanying spores in the fructification of many Algæ.
Paraphyses — distended paranemata ; abortive spores.
Parasitic — growing on, and deriving nourishment from, another plant.
Parietal—attached to the wall of a cell or conceptacle.
Patent—spreading.
Pectinated—divided like the teeth of a comb.
Pectinato-pinnate—spreading as well as divided like the teeth of a comb.
Pedicel, *Peduncle* } the stalk of the fruit.
Pelagic—widely dispersed throughout the ocean.
Pellucid—transparent like glass.
Penninerved—when the nerves are placed at each side of the midrib.
Percurrent—running from one end to the other.
Pericarp—the receptacles in which spores are lodged.
Peripheric—belonging to the periphery.
Periphery—the outer stratum of cells in a cylindrical frond.
Perispore—the membrane or case surrounding the spore.
Phenogamous—flowering plants.
Phyllodium—a flattened, leaf-like portion of the frond.
Pinna—one of a series of distichous branchlets, opposite or alternate.
Pinnule—a secondary pinna.
Pinnate, *Pinnated* } winged.
Pinnatifid—cut transeversely into oblong segments.
Placenta—the part to which the spores are attached.
Plane—level.
Plumule—a pinnated branchlet.
Polygonal—many-angled.
Polyhedral—many-sided.
Polymorphous—many-shaped.
Process—any projecting part.
Proliferous—when a second frond grows from the first.
Propagulum—a reproductive portion of a frond, but not a regular spore.
Pulvinate—cushion or pillow-shaped.
Punctated—dotted.
Pyriform—pear-shaped.

Quadrifarious—proceeding from all sides of the branch.
Quaternate—in fours.

Racemose—having many stalked conceptacles along a branchlet.
Radicle—a small root.
Ramellus—a diminutive of the following.
Ramulus — a minute branch. The ramellus is usually an appendage to the ramulus, and of a different structure.
Receptacles—various shaped bodies containing the spores.
Recurved—bent backwards.
Reniform—kidney-shaped.
Reticulate—veined like net-work.
Retiform—like net-work.
Revolute—rolled back.
Rigid—stiff.
Rotund—round.

Saccate—in the form of a bag.
Scutate—shield-shaped.
Secund—arranged along one side only.
Segments—divisions of the frond.
Septum—a division.
Serrated—toothed like a saw : the teeth are called serratures.
Sessile—without a stalk.
Setaceous—having a diameter equal to a hog's bristle.
Setiform—bristle-shaped.
Silicules—small pod-like fruits.
Simple—unbranched, undivided.
Sinuated—when the margin has numerous shallow blunt indentations.
Sorus (pl. *sori*)—a cluster of spores, as in *Nitophyllum punctatum*. See plate, fig. 8.
Spathulate — rounded at the apex, and tapering at the base.
Sporaceous—convertible into spores.
Sporangium—a spore-case with its contents.
Spore—the seed of cryptogamic plants ; always a simple cell.
Sporidium—a reproductive "spore-like" body.
Sporophylla — small leafy lobes, containing tetraspores.
Stichidia—pod-like receptacles containing tetraspores, as in *Plocamicum coccineum* (5), and *Odonthalia dentata* (6). See plate, figs. 5 and 6.
Stipes—the stem of a leafy frond.
Stipitate—having a stem.
Stratum—a layer.
Stria—a narrow line.
Stupose—covered with hair like wool.
Sub-rotund—roundish.
Subulate—awl-shaped.

Tentacular—resembling the feelers of a snail.
Terete—round : opposed to flat.
Ternate—in threes.
Ternately-parted (tetraspores)—when only three of the sporules are seen at once.

Tetraspore—a spore at maturity dividing into four parts, as in *Polysiphonia urceolata*. See plate, fig. 2.
Tortile—twisted.
Transverse—across ; a cross section.
Trichotomous — dividing always into threes.
Truncate—terminating abruptly as if broken.
Tubercle—a small round mass usually containing seed: synonymous with coccidium, as in *Rhodymenia bifida*. See plate, fig. 7.
Tubular—hollow like a tube.
Type—the perfect representation or idea of anything : thus a typical specimen is strongly characteristic of a species or genus.

Ultra—more than, beyond.
Umbilicated—a depressed surface, surrounded by an elevated margin.
Uncinated—hooked.
Urceolate—expanding at both ends and contracted in the centre; shaped like an ancient pitcher.
Utricle—a small bladder.

Vesicle—a bladder.
Verticillate—whorled; set in a circle round the stem.
Virgate—long and straight like a wand.

Whorled—surrounding a branch in a ring.

Zigzag—angularly bent from side to side.
Zoned (tetraspores)—when the tetraspores are divided into zones by cross lines.
Zoospores—which have a proper locomotive power, resembling the voluntary motion of animals.

GENERAL INDEX.

	Vol.	Page	Diss.	Plate	Syn.
Acanthoceras					
Shuttleworthiana	ii.	113	—	107	
Actinococcus, 26*					
Hennedyi	i.	175	176	—	84†
Ægagropila					
simplex	iv.	23	24	—	
Agardhia					
Bursa	iv.	1	2	—	
Agarum					
esculentum	iii.	43	—	146	
Aglaiophyllum					
Bonnemaisoni	i.	131	—	46	
Gmelini	i.	133	—	47	
Hilliæ	i.	135	—	48	
laceratum	i.	137	—	49	
ocellatum	i.	140	—	—	
punctatum	i.	139	—	50	
versicolor	i.	143	—	51	
Aglaiozonia					
parvula	iii.	77	78	—	
reptans	iii.	77	78	—	
Ahnfeldtia, 46					
plicata	ii.	47	—	84	110
Alaria, 76					
esculenta	iii.	43	—	146	200
Alcyonidium					
bullatum	iv.	147	148	—	
Alcyonium					
Bursa	iv.	1	2	—	
Alsidium					
scorpioides	i.	11	—	6	
tenuissimum	i.	9	—	5	
Anabaina					
marina	iv.	197	198	—	
Thwaitesii	iv.	199	200	—	
Arthrocladia, 73					
villosa	iii.	37	—	144	197
Asperocaulon					
coccineum	i.	69	—	26	
Asperococcus, 88					
bullosus	iii.	99	100	—	
castaneus	iii.	65	—	153	
compressus	iii.	97	—	165	223
echinatus	iii.	101	—	166	225
β vermicularis	iii.	101	—	—	
fistulosus	iii.	101	—	166	
laminariæ	iii.	105	106	—	

	Vol.	Page	Diss.	Plate	Syn.
Asperococcus					
pusillus	iii.	103	104	—	
rugosus	iii.	101	—	166	
β bullosus	iii.	99	100	—	
Turneri	iii.	99	100	—	224
vermicularis	iii.	101	—	166	
Bangia, 110					
atro-purpurea	iv.	135	136	—	
ceramicola	iv.	139	140	—	341
ciliaris	iv.	137	138	—	340
elegans	iv.	141	142	—	342
fusco-purpurea	iv.	135	136	—	339
Johnstoni	iv.	81	82	—	
laminariæ	iii.	105	106	—	
versicolor	iv.	135	136	—	
viridis	iv.	81	82	—	
Batrachospermum					
attenuatum	ii.	119	—	109	
Belonia					
torulosa	iv.	197	198	—	
Bonnemaisonia, 8					
asparagoides	i.	77	—	30	39
Boryna					
ciliata	ii.	115	—	108	
diaphana	ii.	99	—	102	
Bostrychia, 4					
scorpioides	i.	11	—	6	6
Bryopsis, 101					
arbuscula	iv.	13	—	185	
hypnoides	iv.	13	—	185	280
Lyngbyæi	iv.	11	—	184	
plumosa	iv.	11	—	184	279
Bursa					
marina	iv.	1	2	—	
Byssus					
purpurea	ii.	193	194	—	
Calliblepharis, 18					
ciliata	i.	145	—	52	71
jubata	i.	147	—	53	72
Callithamnion, 66					
affine	ii.	181	182	—	169
arbuscula	ii.	159	—	119	158
barbatum	ii.	155	156	—	156
Borreri	ii.	179	—	126	168
botryticum	ii.	141	—	116	

* Those figures following the Generic names in Index refer to the numbers in the Synopsis of Families and Genera.

† Those figures opposite the Specific names in Index refer to the numbers in the Synopsis of Species.

	Vol.	Page	Diss.	Plate	Syn.
Callithamnion					
brachiatum	ii.	165	—	122	161
Brodiæi	ii.	161	—	120	159
byssoideum	ii.	173	174	—	165
clavatum	ii.	141	—	116	
coccineum	i.	69	—	26	
corallinum	ii.	135	—	113	
corymbosum	ii.	189	—	128	173
cruciatum	ii.	147	148	—	153
β pumilum	ii.	147	—	—	
Daviesii	ii.	201	203	—	179
Daviesii. Var.	ii.	201	203	—	
fasciculatum	ii.	177	178	—	167
floccosum	ii.	149	150	—	154
floridulum	ii.	195	196	—	176
floridulum	ii.	199	200	—	
gracillimum	ii.	185	186	—	170
granulatum	ii.	165	—	122	174
granulatum	ii.	191	—	129	
Grevillii	ii.	175	176	—	
Harveyanum	ii.	165	—	122	
hirtum, var. β	ii.	165	—	122	
Hookeri	ii.	169	—	124	163
lanosum	ii.	169	—	124	
mesocarpum	ii.	197	198	—	177
multifidum	i.	185	—	65	
nodulosum	ii.	119	—	109	
pedicellatum	ii.	141	—	116	
Perreymondii	ii.	141	—	116	
pluma	ii.	157	158	—	151
plumula	ii.	145	—	118	152
plumula	ii.	149	150	—	
β pusillum	ii.	157	—	158	
Pollexfenii	ii.	149	150	—	
polyspermum	ii.	175	176	—	166
purpurascens	ii.	175	176	—	
purpureum	ii.	193	194	—	
Ralfsii	ii.	155	156	—	
repens	ii.	151	152	—	
roseum	ii.	171	—	125	164
roseum	ii.	175	176	—	
Rothii	ii.	193	194	—	175
β purpureum	ii.	193	194	—	
seirospermum	ii.	143	—	117	
seminudum	ii.	179	—	126	
sparsum	ii.	199	200	—	178
spinosum	ii.	169	—	124	
spongiosum	ii.	191	—	129	
tetragonum	ii.	163	—	121	160
tetricum	ii.	167	—	123	162
thuyoideum	ii.	187	—	127	172
thuyoides	ii.	187	—	127	
tripinnatum	ii.	183	184	—	170
tripinnatum	ii.	187	—	127	
Turneri	ii.	151	153	—	155
Turneri, β	ii.	151	153	—	
variabile	ii.	151	152	—	
versicolor, β seirospermum	ii.	143	—	117	
versicolor	ii.	189	—	128	
virgatulum	ii.	201	203	—	
Callophyllis, 48					
cristata	ii.	17	—	72	
laciniata	ii.	51	—	86	112

	Vol.	Page	Diss.	Plate	Syn.
Calothrix, 114					
cæspitula	iv.	167	168	—	355
confervicola	iv.	153	154	—	348
fasciculata	iv.	157	158	—	350
hydnoides	iv.	165	166	—	354
lamellata	iv.	161	162	—	
lamellata	iv.	163	164	—	
luteola	iv.	155	156	—	349
melaleuca	iv.	155	156	—	
pannosa	iv.	161	162	—	352
scopulorum	iv.	159	160	—	351
semiplena	iv.	163	164	—	353
Carmichaelia					
attenuata	iii.	89	—	162	
Carpomitra, 75					
Cabreræ	iii.	41	42	—	199
Catenella, 42					
Opuntia	ii.	25	26	—	100
Ceramium, 59					
acanthonotum	ii.	113	—	107	138
Agardhianum	ii.	95	—	101	
asparagoides	i.	77	—	30	
axillare	ii.	87	—	100	
botryocarpum	ii.	91	92	—	128
Boucheri	i.	71	—	27	
brachygonium	i.	37	—	15	
Brodiæi	i.	45	—	18	
Casuarinæ	i.	185	—	65	
ceramicola	iv.	139	140	—	
ciliatum, β acanthonotum	ii.	113	—	107	
ciliatum	ii.	115	—	108	139
cirrhosum	iii.	157	158	—	
clavægerum	ii.	141	—	116	
confervoides	iii.	165	—	174	
corallinum, var. majus	ii.	137	—	114	
corymbosum	ii.	189	—	128	
decurrens	ii.	93	94	—	129
Deslongchampii	ii.	95	—	101	130
Desmazieri	ii.	137	—	114	
diaphanum	ii.	99	—	102	131
var. ciliatum	ii.	115	—	108	
var.	ii.	105	—	104	
echionotum	ii.	111	—	106	137
elongatum	i.	37	—	15	
elongatum	ii.	87	—	100	
equisetifolium	ii.	127	—	112	
fastigiatum	i.	63	—	23	135
fastigiatum	ii.	107	108	—	
filamentosum	ii.	81	—	98	
filicinum	iii.	149	—	171	
filum	iii.	61	—	152	
flabelligerum	ii.	109	—	105	136
flaccidum	ii.	101	102	—	
gigartinum	ii.	55	—	88	
gracillimum	ii.	101	102	—	132
hirsutum	i.	69	—	26	
Hookeri	ii.	169	—	124	
incurvum	i.	17	—	9	
miniatum	ii.	179	—	126	
molle	i.	67	—	25	
nodosum	ii.	105	—	104	134
nodulosum	ii.	87	—	100	
ocellatum	i.	75	—	29	

	Vol.	Page	Diss.	Plate	Syn.
Ceramium					
pedicellatum	ii.	141	—	116	
pennatum	iii.	155	—	173	
pinnulatum	ii.	179	—	126	
Plocamium	ii.	5	—	68	
plumosum	ii.	121	—	110	
pluma	ii.	157	158	—	
plumula	ii.	145	—	118	
repens	ii.	151	152	—	
rigidulum	ii.	105	—	104	
roseum	ii.	171	—	225	
Rothii	ii.	193	194	—	127
rubrum	ii.	87	—	100	
rubrum secundatum	ii.	87	—	—	
γ proliferum	ii.	91	92	—	
α decurrens	ii.	93	94	—	
scoparium	iii.	153	—	172	
seirospermum	ii.	143	—	117	
siliculosum	iii.	165	—	174	
strictum	ii.	103	—	103	133
tetragonum	ii.	163	—	121	
tomentosum	iii.	175	—	177	
tuberculosum	iii.	83	—	159	
Turneri	ii.	151	152	—	
versicolor	ii.	189	—	128	
verticillatum	i.	185	—	65	
verticillatum	iii.	145	—	169	
virgatum	ii.	87	—	100	
Wulfeni	i.	15	—	8	
Chætoderma					
pellita	i.	171	172	—	
Chætomorpha					
ærea	iv.	93	94	—	
melagonium	iv.	91	92	—	
sutoria	iv.	89	90	—	
tortuosa	iv.	79	80	—	
Chætophora					
atra	iv.	145	146	—	
Berkeleyi	iii.	119	120	—	
marina	iii.	117	118	—	
multifida	i.	177	—	61	
pellita	i.	171	172	—	
pellita	i.	173	174	—	
vermiculata	iii.	111	—	168	
Chætopteris					
plumosus	iii.	155	—	173	
Chætospora					
Wigghii	i.	187	—	66	
Champia, 11					
parvula	i.	91	—	36	46
Chantransia					
tomentosa	iii.	175	—	177	
Chlorosiphon					
laminariæ	iii.	105	106	—	
pusillus	iii.	103	104	—	
Shuttleworthianus	iii.	65	—	153	
Chondracanthus					
Teedii	ii.	59	60	—	
Chondria, 3					
articulata	ii.	27	—	75	
clavellosa	ii.	29	—	76	
dasyphylla	i.	7	8	4	4
kaliformis	i.	87	—	35	

	Vol.	Page	Diss.	Plate	Syn.
Chondria					
obtusa	i.	79	—	31	
opuntia	ii.	25	26	—	
ovalis	i.	85	—	34	
parvula	i.	91	—	36	
pinnatifida	i.	81	—	32	
purpurascens	ii.	23	—	74	
tenuissima	i.	9	10	5	5
Chondrothamnion					
clavellosum	ii.	29	—	76	
confertum	ii.	29	—	76	
Chondrus, 51					
Brodiæi	ii.	37	—	80	
β simplex	ii.	39	—	81	
Celticus	ii.	65	—	91	
crispus	ii.	65	—	91	118
Griffithsiæ	ii.	41	—	82	
incurvatus	ii.	65	—	91	
laceratus	i.	137	—	49	
mamillosus	ii.	61	—	90	
membranifolius	ii.	35	—	79	
multipartitus	i.	155	—	57	
polymorphus	ii.	65	—	91	
rubens	ii.	33	—	78	
Chorda, 78					
filum	iii.	61	—	152	207
β tomentosa	iii.	61	—	152	
fistulosa	iii.	65	—	65	
lomentaria	iii.	65	—	153	208
tomentosa	iii.	61	—	152	
Chordaria, 90					
divaricata	iii.	109	110	—	229
filum	iii.	61	—	152	
flagelliformis	iii.	107	—	167	228
multifida	i.	177	—	61	
opuntia	ii.	25	26	—	
paradoxa	iii.	85	—	160	
rhizodes	iii.	83	—	159	
rotunda	i.	165	—	60	
viridis	iii.	35	36	—	
Chrysymenia					
clavellosa	ii.	29	—	76	
Orcadensis	ii.	31	—	77	
rosea	ii.	31	—	77	
var. Orcadensis	ii.	31	—	77	
Chylocladia, 43					
articulata	ii.	27	—	75	104
clavellosa	ii.	29	—	76	102
kaliformis	i.	87	—	35	
ovalis	i.	85	—	34	
parvula	i.	91	—	36	
reflexa	i.	89	90	—	
rosea	ii.	31	—	77	103
Cladophora, 103					
Ægæa	iv.	39	—	191	
albida	iv.	51	—	194	299
arcta	iv.	57	—	196	302
Balliana	iv.	45	46	—	296
Brownii	iv.	21	22	—	284
centralis	iv.	57	—	196	
diffusa	iv.	33	—	189	290
falcata	iv.	63	64	—	304
flavescens	iv.	69	70	—	307

	Vol.	Page	Diss.	Plate	Syn.
Cladophora					
flexuosa	iv.	41	42	—	294
fracta	iv.	71	72	—	308
Gattyæ	iv.	67	68	—	306
glaucescens	iv.	61	—	197	303
gracilis	iv.	43	—	192	295
Hutchinsiæ	iv.	31	—	188	289
lætevirens	iv.	39	—	191	293
lanosa	iv.	53	—	195	300
Macallana	iv.	29	30	—	288
Magdalenæ	iv.	65	66	—	305
nuda	iv.	35	36	—	291
pellucida	iv.	25	—	186	286
rectangularis	iv.	27	—	187	287
refracta	iv.	49	—	193	298
repens	iv.	23	24	—	285
rupestris	iv.	37	—	190	292
β distorta	iv.	37	—	—	
Rudolphiana	iv.	47	48	—	297
sirocladia β gracilis	iv.	41	42	—	
uncialis	iv.	55	56	—	301
Vaucheriæformis	iv.	57	—	196	
Cladostephus, 96					
laxus	iii.	147	—	170	
myriophyllum	iii.	145	—	169	
spongiosus	iii.	147	—	170	248
verticillatus	iii.	145	—	169	247
Wigghii	i.	187	—	66	
Coccotylus					
Brodiæi	ii.	37	—	80	
Codium, 100					
adhærens	iv.	3	4	—	276
amphibium	iv.	5	6	—	277
Bursa	iv.	1	2	—	275
elongatum	iv.	7	—	183	
filiforme	iv.	7	—	183	
lineare	iv.	7	—	183	
tomentosum	iv.	7	—	183	278
Conferva, 105					
ærea	iv.	93	94	—	319
β lubrica	iv.	95	96	—	
albida	iv.	51	—	194	
antennina	iv.	93	94	—	
arbuscula	i.	71	—	27	
arbuscula	ii.	159	—	119	
arcta	iv.	57	—	196	
arenicola	iv.	77	78	—	311
arenosa	iv.	83	84	—	312
atro-purpurea	iv.	135	136	—	
atro-rubescens	i.	59	—	22	
badia	i.	59	—	22	
bangioides	iv.	97	98	—	321
barbata	ii.	131	132	—	
Borreri	ii.	179	—	126	
brachiata	iii.	193	194	—	
breviarticulata	iii.	125	126	—	
Brodiæi	i.	45	—	18	
Brownii	iv.	21	22	—	
byssoides	i.	67	—	25	
cancellata	ii.	127	—	112	
capillaris	iv.	87	88	—	
centralis	iv.	57	—	196	

	Vol.	Page	Diss.	Plate	Syn.
Conferva					
ceramicola	iv.	139	140	—	
ceratophyllum	iii.	145	—	169	
ciliata	ii.	115	—	108	
cirrhosa	iii.	157	158	—	
clathrata	iv.	113	114	—	
coccinea	i.	69	—	26	
collabens	iv.	95	96	—	320
compressa	iv.	107	—	199	
confervicola	iv.	153	154	—	
corallina	ii.	135	—	113	
corallinoides	ii.	135	—	113	
corymbosa	ii.	189	—	128	
crassa	iv.	87	88	—	
crinita	iii.	89	—	162	
Crouani	iv.	27	—	187	
curta	iii.	127	128	—	
Daviesii	ii.	201	203	—	
denudata	i.	59	—	22	
diaphana	ii.	99	—	102	
distans	iv.	33	—	189	
divaricata	iv.	71	72	—	
elongata	i.	37	—	15	
equisetifolia	ii.	127	—	112	
ferruginea	iii.	123	124	—	
fibrata	i.	27	—	13	
filiformis	ii.	23	—	74	
fistula	iii.	101	—	166	
flacca	iv.	177	178	—	
flaccida	iii.	125	126	—	
flavescens	iv.	69	70	—	
flavescens	iv.	71	72	—	
floccosa	ii.	149	150	—	
flosculosa	ii.	87	—	100	
floridula	ii.	195	196	—	
fœniculacea	iii.	87	—	161	
fracta	iv.	71	72	—	
fucicola	iii.	123	124	—	
fucoides	i.	53	—	20	
fusca	iii.	159	160	—	
fusco-purpurea	iv.	135	136	—	
geniculata	ii.	135	—	113	
glauca	iv.	37	—	90	
glaucescens	iv.	61	—	197	
glomerata β marina	iv.	39	—	191	
gracilis	iii.	83	—	159	
gracilis	iv.	43	—	192	
granulosa	iii.	189	—	180	
Griffithsiana	ii.	81	—	98	
hirta	iv.	71	72	—	
Hookeri	ii.	169	—	124	
Hutchinsiæ	iv.	31	—	188	
Kaneana	iv.	47	48	—	
imbricata	ii.	127	—	112	
implexa	iv.	81	82	—	317
intertexta	i.	49	50	—	
intertexta	iii.	157	158	—	
intricata	iv.	81	82	—	
isogona	iv.	99	100	—	
lætevirens	iv.	39	—	191	
lanosa	iv.	53	—	195	
linum	iv.	85	86	—	314
linum	iv.	87	88	—	

	Vol.	Page	Diss.	Plate	Syn.
Conferva					
littoralis	iii.	185	—	179	
litorea	iv.	85	86	—	313
majuscula	iv.	169	—	207	
Mertensii	iii.	195	—	182	
marina, &c.	ii.	135	—	113	
melagonium	iv.	91	92	—	318
multifida	i.	185	—	65	
myriophyllum	iii.	145	—	169	
nigra	i.	59	—	22	
nigrescens	i.	53	—	20	
nodulosa	ii.	87	—	100	
nodulosa	ii.	99	—	102	
nuda	iv.	35	36	—	
obtusa	iii.	125	126	—	
obtusangula	iv.	73	74	—	
olivacea	iii.	161	162	—	
paradoxa	iv.	113	114	—	
parasitica	i.	65	—	24	
patens	i.	21	—	11	
pedicellata	ii.	141	—	116	
pellucida	iv.	25	26	—	
pennata	iii.	155	—	173	
pennata	iii.	157	158	—	
perreptans	iv.	73	74	—	
pilosa	ii.	115	—	108	
pluma	ii.	157	158	—	
plumosa	i.	69	—	26	
plumula	ii.	145	—	118	
polymorpha	i.	63	—	23	
pulvinata	i.	25	26	—	
pulvinata	iv.	21	22	—	
purpurea	ii.	193	194	—	
radicans	iii.	161	162	—	
rectangularis	iv.	27	—	187	
refracta	iv.	49	—	193	
repens	ii.	151	152	—	
repens	iv.	23	24	—	
rhizodes	iii.	83	—	159	
riparia	iv.	73	74	—	
rosea	ii.	171	—	125	
Rothii	ii.	193	194	—	
rubra	ii.	87	—	100	
Rudolphiana	iv.	47	48	—	
rupestris	iv.	37	—	190	
scoparia	iii.	153	—	172	
scopulorum	iv.	159	160	—	
scutulata	iii.	131	132	—	
setacea	ii.	139	—	115	
siliculosa	iii.	165	—	174	
spongiosa	iii.	147	—	170	
squarrosa	i.	5	6	3	
stellulata	iii.	129	130	—	
sutoria	iv.	89	90	—	315
tenella	ii.	151	152	—	
tetragona	ii.	163	—	121	
tetrica	ii.	167	—	123	
thuyoides	ii.	187	—	127	
tomentosa	iii.	175	—	177	
tortuosa	iv.	73	74	—	316
tortuosa	iv.	79	80	—	
tubulosa	ii.	87	—	100	
Turneri	ii.	145	—	118	
Turneri	ii.	151	152	—	
ulothrix	iv.	81	82	—	
uncialis	iv.	55	56	—	
urceolata	i.	21	—	11	
vagabunda	iv.	71	72	—	
verrucosa	iii.	83	—	159	
verticillata	iii.	145	—	169	
villosa	iii.	37	—	144	
violacea	ii.	193	194	—	
virgata	iv.	37	—	190	
Youngana	iv.	99	100	—	322
Corallina, 12					
Anglica	i.	93	—	37	
corniculata	i.	99	—	40	
membranacea	i.	111	112	—	
officinalis	i.	93	—	37	47
rubens	i.	97	—	39	
squamata	i.	95	—	38	48
Corallinum					
cretaceum lichenoides	i.	101	—	41	
Corallopsis					
dichotoma	i.	183	—	64	
Cordylecladia, 39					
erecta	ii.	19	20	—	97
Corynephora					
marina	iii.	117	118	—	
Corynospora, 64					
pedicellata	ii.	141	—	116	150
Crouania, 61					
attenuata	ii.	119	—	109	141
verrucosa	iii.	121	122	—	
Cruoria, 27					
pellita	i.	171	172	—	
pellita	i.	173	174	—	
adhærens	i.	173	174	—	83
Cryptopleura					
lacerata	i.	137	—	49	
Cutleria, 79					
multifida	iii.	67	—	154	209
Cymadusa					
tuberculata	iii.	13	—	135	
Cystoclonium, 47					
purpurascens	ii.	49	—	85	111
purpurascens β	ii.	49	—	85	
Cystoseira, 68					
abrotanifolia	iii.	9	—	133	
barbata	iii.	7	8	—	183
discors	iii.	9	—	133	
ericoides	iii.	3	—	131	181
fœniculacea	iii.	9	—	133	184
fibrosa	iii.	11	—	134	185
granulata	iii.	5	—	132	182
siliquosa	iii.	1	—	130	
Dasya, 7					
arbuscula	i.	71	—	27	36
coccinea	i.	69	—	26	35
Hutchinsiæ	i.	71	—	27	
ocellata	i.	75	—	29	38
simpliciuscula	i.	75	—	29	
spongiosa	ii.	159	—	119	
venusta	i.	73	—	28	37

	Vol.	Page	Diss.	Plate	Syn.
Delesseria, 16					
alata	i.	121	—	42, A, B	61
β angustissima	i.	121	—		
β angustifolia	i.	121	—		
angustissima	i.	122	—		
bifida	ii.	15	—	71	
Bonnemaisoni	i.	131	—	46	
Brodiæi	ii.	37	—	80	
ciliaris	ii.	51	—	86	
ciliata	i.	145	—	52	
coccinea	ii.	5	—	68	
dentata	i.	1	2	1	
edulis	ii.	77	—	96	
Ferrarii	ii.	75	—	95	
filicina	ii.	73	—	94	
glandulosa	ii.	83	—	99	
Gmelini	i.	133	—	47	
Hilliæ	i.	135	—	48	
hypoglossum	i.	125	—	43	62
interrupta	ii.	21	—	73	
lacerata	i.	137	—	49	
laciniata	ii.	51	—	86	
ocellata	i.	140	—	—	
palmata	ii.	11	—	70	
Palmetta	ii.	9	—	69	
Plocamium	ii.	5	—	68	
punctata	i.	139	—	50	
rubens	ii.	33	—	78	
ruscifolia	i.	127	—	44	63
sanguinea	ii.	1	—	67	
sinuosa	i.	129	—	45	64
ulvoides	i.	139	—	50	
Desmarestia, 72					
aculeata	iii.	33	—	143	195
ligulata	iii.	31	—	142	194
viridis	iii.	35	36	—	196
Desmia					
aculeata	iii.	33	—	143	
ligulata	iii.	31	—	143	
Desmotrichum					
Laminariæ	iii.	105	106	—	
Dichloria					
viridis	iii.	35	36	—	
Dichophyllium					
dichotomum	iii.	81	—	158	
implexum	iii.	81	—	158	
vulgare	iii.	81	—	158	
Dictyopteris					
elongata	iii.	69	—	155	
polypodioides	iii.	69	—	155	
Dictyosiphon, 85					
fœniculaceus	iii.	87	—	161	218
Dictyota, 83					
atomaria	iii.	79	—	157	214
ciliata	iii.	79	—	157	
dichotoma	iii.	81	—	158	215
β intricata	iii.	81	—	—	
β implexa	iii.	81	—	—	
implexa	iii.	81	—	—	
lineolata	iii.	89	—	162	
multifida	iii.	67	—	154	
Pavonia	iii.	71	—	156	
penicillata	iii.	67	—	154	
Dictyota					
zonata	iii.	79	—	157	
Diplostromium					
plantagineum	iii.	93	—	164	
plantagineum	iii.	95	96	—	
Dudresnaia, 60					
coccinea	ii.	117	118	—	140
divaricata	i.	181	—	63	
Dumontia, 41					
Calvadosii	i.	179	—	62	
filiformis	ii.	23	—	74	99
β crispata	ii.	23	—	74	
incrassata	ii.	23	—	74	
triquetra	i.	183	—	64	
Echinoceras					
ciliatum	ii.	115	—	108	
Ectocarpus, 98					
amphibius	iii.	167	168	—	258
brachiatus	iii.	191	—	181	
brachiatus	iii.	193	194	—	271
compactus	iii.	185	—	179	
crinitus	iii.	177	—	178	263
cruciatus	iii.	193	194	—	
distortus	iii.	181	182	—	265
fasciculatus	iii.	171	—	175	260
fenestratus	iii.	169	170	—	259
ferrugineus	iii.	185	—	179	
granulosus	iii.	189	—	180	269
Hincksiæ	iii.	173	—	176	261
Landsburgii	iii.	183	184	—	266
littoralis	iii.	185	—	179	267
longifructus	iii.	187	188	—	268
Mertensii	iii.	195	—	182	272
pusillus	iii.	179	180	—	264
siliculosus	iii.	165	—	174	257
siliculosus longipes	iii.	165	—	174	
sphærophorus	iii.	191	—	181	270
tomentosus	iii.	175	—	177	262
Elachista, 94					
attenuata	iii.	133	134	—	241
breviarticulata	iii.	125	126	—	
curta	iii.	127	128	—	238
flaccida	iii.	125	126	—	237
fucicola	iii.	123	124	—	236
pulvinata	iii.	133	134	—	
scutulata	iii.	131	132	—	240
stellulata	iii.	129	130	—	239
velutina	iii.	135	136	—	242
Elaionema					
villosum	iii.	37	—	144	
Ellisius					
coccineus	i.	69	—	26	
Encœlium					
bullosum	iii.	99	100	—	
echinatum	iii.	101	—	166	
Lyngbyanum	iii.	101	—	166	
Enteromorpha, 107					
clathrata	iv.	115	—	201	
γ uncinata	iv.	115	—	201	
clathrata	iv.	113	114	—	329
β erecta	iv.	111	—	200	
compressa	iv.	107	—	199	326
Cornucopiæ	iv.	103	104	—	324

	Vol.	Page	Diss.	Plate	Syn.
Enteromorpha					
erecta	iv.	111	—	200	328
Hopkirkii	iv.	117	118	—	331
intestinalis	iv.	105	—	198	325
Linkiana	iv.	109	110	—	327
percursa	iv.	119	120	—	332
Ralfsii	iv.	121	122	—	333
ramulosa	iv.	115	—	201	330
Euactis					
atra	iv.	145	146	—	
Euhymenia					
reniformis	ii.	53	—	87	
Euthora, 38					
cristata	ii.	17	—	72	96
Fistularia					
compressa	iv.	107	—	199	
erecta	iv.	111	—	200	
intestinalis	iv.	105	—	198	
Fucodium					
canaliculatum	iii.	27	—	140	
Fucus, 70					
abrotanifolius	iii.	9	—	133	
abrotanoides	iii.	11	—	134	
acicularis	ii.	59	—	89	
aculeatus	iii.	33	—	143	
æruginosus	i.	155	—	57	
alatus	i.	121	—	42 A, B	
γ angustissimus	i.	122	—		
alatus, jr.	i.	122	—		
albidus	i.	151	—	55	
alveolatus	ii.	61	—	90	
ambiguus	iii.	69	—	155	
amphibius	i.	11	—	6	
articulatus	ii.	27	—	75	
asparagoides	i.	77	—	30	
atomarius	i.	1	2	1	
baccatus	iii.	11	—	134	
Balticus	iii.	15	—	—	
barbatus	iii.	7	8	—	
bifidus	ii.	9	—	69	
bifidus	ii.	15	—	71	
bifurcatus	iii.	13	—	135	
bulbosus	iii.	49	—	148	
bullatus	ii.	11	—	70	
Bursa	iv.	1	2	—	
byssoides	i.	67	—	25	
Cabreræ	iii.	41	42	—	
cæspitosus	i.	161	—	—	
cæspitosus	ii.	25	26	—	
canaliculatus β	ii.	61	—	90	
canaliculatus	iii.	27	—	140	192
capensis	i.	157	—	58	
capillaris	ii.	79	—	97	
caprinus	i.	165	—	60	
caprinus	ii.	11	—	70	
carnosus	ii.	77	—	96	
cartilagineus	i.	149	—	54	
cartilagineus	i.	157	—	58	
ceranoides, var.	ii.	61	—	90	
ceranoides	ii.	65	—	91	
ceranoides	iii.	19	—	137	188
ciliatus	i.	145	—	52	
var. jubatus	i.	147	—	53	

	Vol.	Page	Diss.	Plate	Syn.
Fucus					
ciliatus, var. lanceolatus	i.	147	—	53	
angustus	i.	147	—	53	
spinosus	i.	147	—	53	
clavellosus	ii.	29	—	76	
coccineus	ii.	5	—	68	
concatenatus	iii.	5	—	132	
confervoides	i.	3	—	2	
confervoides	i.	151	—	55	
corneus	i.	159	—	59 A, B, C	
var. sesquipedalis	i.	160	—	—	
uniformis	i.	160	—	—	
capillaceus	i.	160	—	—	
confertus	i.	160	—	—	
abnormis	i.	161	—	—	
pulchellus	i.	161	—	—	
clavifer	i.	161	—	—	
coronopifolius	i.	149	—	54	
coronopi-facie	i.	149	—	54	
crenatus	i.	129	—	45	
crinalis	i.	162	—	—	
crispatus	ii.	137	—	49	
crispatus	ii.	51	—	86	
crispatus	ii.	65	—	91	
crispus	ii.	33	—	78	
crispus	ii.	51	—	86	
crispus	ii.	65	—	91	
cristatus, γ articulatus	i.	13	—	7	
cristatus	ii.	17	—	72	
dasyphyllus	i.	7	8	4	
dentatus	i.	1	2	1	
Devoniensis	ii.	45	—	83	
digitatus	iii.	45	—	147	
discors	iii.	9	—	133	
distichus	iii.	15	—	136	
distichus	iii.	19	—	137	
divaricatus	iii.	15	—	136	
dulcis	ii.	77	—	96	
dulcis	ii.	11	—	70	
echinatus	ii.	61	—	90	
edulis	ii.	77	—	96	
elongatus	iii.	29	—	141	
endiviæfolius	i.	137	—	49	
epiphyllus	ii.	33	—	78	
ericoides	iii.	3	—	131	
esculentus	iii.	43	—	146	
excisus	iii.	27	—	140	
fascia	iii.	59	—	151	
fastigiatus	i.	165	—	60	
fastigiatus	ii.	71	—	93	
fibrosus	iii.	11	—	134	
filamentosus	ii.	81	—	98	
filicinus	ii.	73	—	94	
filiformis	ii.	65	—	91	
filum	iii.	61	—	152	
fimbriatus	ii.	35	—	79	
fimbriatus	iii.	43	—	146	
flagellaris	i.	151	—	55	
flagelliformis	iii.	107	—	167	
fœniculaceus	iii.	7	8	—	
fœniculaceus	iii.	9	—	133	

Fucus	Vol.	Page	Diss.	Plate	Syn.
friabilis	ii.	81	—	98	
fruticulosus	i.	15	—	8	
fungularis	iii.	121	122	—	
furcellatus	ii.	71	—	93	
gigartinus	ii.	17	—	72	
gigartinus	ii.	55	—	88	
glandulosus	ii.	83	—	99	
granulatus	iii.	5	—	132	
granatus	i.	155	—	57	
graneatus	i.	140	—	—	
Griffithsiæ	ii.	41	—	82	
herbaceus	iii.	31	—	142	
hirsutus	iii.	147	—	170	
hydridus	i.	83	—	33	
hyperboreus	iii.	45	—	147	
hypnoides	i.	160	—	—	
hypoglossoides	i.	125	—	43	
hypoglossum	i	125	—	43	
inflatus	iii.	15	—	136	
incurvus	i.	17	—	9	
jubatus	i.	147	—	53	
kaliformis	i.	87	—	35	
γ nanus	i.	91	—	36	
laceratus	i.	137	—	49	
lacerus	ii.	65	—	91	
laciniatus	ii.	51	—	86	
lactuca	ii.	77	—	96	
lanosus	i.	63	—	23	
ligulatus	iii.	31	—	142	
linearis	iii.	15	—	136	
loreus	iii.	29	—	141	
longissimus	i.	151	—	55	
Mackaii	iii.	25	26	—	191
mamillosus	ii.	61	—	90	
membranaceus	iii.	69	—	155	
membranifolius	ii.	35	—	79	
var. roseus	ii.	39	—	81	
membranifolius	ii.	65	—	91	
miniatus	ii.	51	—	86	
mucronatus	iii.	5	—	132	
multifidus	i.	81	—	32	
multipartitus	i.	155	—	57	
muscoides	iii.	33	—	143	
nodicaulis	iii.	5	—	132	
nodosus	iii.	23	—	139	190
γ Mackaii	iii.	25	26	—	
Norvegicus	ii.	45	—	83	
obtusus	i.	79	—	31	
ocellatus	i.	140	—	—	
Œderi	ii.	55	—	88	
opuntia	ii.	25	26	—	
ovalis	i.	85	—	34	
ovinus	ii.	11	—	70	
palmatus	ii.	11	—	70	
palmatus β	ii.	77	—	96	
palmatus	iii.	49	—	148	
palmetta, varietas	i.	129	—	45	
palmetta	ii.	9	—	69	
patens	ii.	65	—	91	
Pavonius	iii.	71	—	156	
pectinatus	ii.	125	—	111	
pedunculatus	iii.	39	—	145	

Fucus	Vol.	Page	Diss.	Plate	Syn.
Phyllitis	iii.	57	—	150	
phyllitidii folio	iii.	57	—	150	
pinastroides	i.	17	—	9	
pinnatifidus	i.	1	2	1	
pinnatifidus	i.	81	—	32	
pinnatus	i.	160	—	—	
pinnatus	iii.	43	—	146	
pistillatus	ii.	55	—	88	
plicatus	ii.	47	—	84	
plocamium	ii.	5	—	68	
plumosus	ii.	121	—	110	
polymorphus	ii.	61	—	90	
polymorphus	ii.	65	—	91	
polypodioides	iii.	69	—	155	
polyschides	iii.	49	—	148	
prolifer	ii.	33	—	78	
ptilotus	ii.	125	—	111	
punctatus	i.	139	—	50	
purpurascens	ii.	49	—	85	
pusillus	i.	161	—	—	
radiatus	i.	165	—	60	
reniformis	ii.	53	—	87	
repens	ii.	25	26	—	
rhizodes	iii.	83	—	159	
roseus	i.	129	—	45	
rotundus	i.	165	—	60	
rubens	i.	129	—	45	
rubens	ii.	11	—	70	
rubens	ii.	33	—	78	
ruscifolius	i.	127	—	44	
saccharinus	iii.	55	—	149	
sanguineus	ii.	1	—	67	
scorpioides	i.	11	—	6	
sedoides	i.	85	—	34	
selaginoides	iii.	3	—	131	
sericeus, var.	ii.	27	—	75	
sericeus	ii.	125	—	111	
serratus	iii.	21	—	138	189
setaceus	i.	3	—	2	
setaceus	iii.	11	—	134	
Sherardi	iii.	15	—	136	
siliculosus	iii.	1	—	130	
siliquosus	iii.	1	—	130	
sinuosus	i.	129	—	45	
spiralis	iii.	15	—	136	
stellatus	ii.	65	—	91	
subfuscus	i.	3	—	2	
subtilis	iii.	87	—	161	
tamariscifolius	iii.	3	—	131	
Teedii	ii.	59	60	—	
Tendo	iii.	61	—	152	
tenuissimus	i.	9	—	5	
teres	iii.	43	—	146	
tetragonus	iii.	43	—	146	
tomentosus	iv.	7	—	183	
tuberculatus	ii.	49	—	85	
tuberculatus, β	ii.	49	—	85	
tuberculatus	iii.	13	—	135	
ulvoides	i.	139	—	50	
variabilis	i.	3	—	2	
versicolor	i.	157	—	58	
vermicularis	i.	85	—	34	

	Vol.	Page	Diss.	Plate	Syn.
Fucus					
verrucosus	i.	151	—	55	
verticillatus	i.	87	—	35	
verticillatus	iii.	145	—	169	
vesiculosus	iii.	15	—	136	187
β subecostatus	iii.	15	—	—	
volubilis	iii.	15	—	136	
viridis	iii.	35	36	—	
Wigghii	i.	187	—	66	
Furcellaria, 53					
fastigiata	ii.	71	—	93	120
lycopodioides	i.	5	6	3	
lumbricalis	ii.	71	—	93	
lumbricalis	i.	165	—	60	
rotunda	i.	165	—	60	
Gastridium					
clavellosum	ii.	29	—	76	
filiforme	ii.	23	—	74	
kaliforme	i.	87	—	35	
Opuntia	iii.	99	100	—	
ovale	i.	85	—	34	
parvulum	i.	91	—	36	
purpurascens	ii.	29	—	76	
Gastroclonium					
ovale	i.	85	—	34	
Gelidium, 21					
cartilagineum	i.	147	—	58	77
concatenatum	i.	157	—	58	
corneum	i.	159	—	59 A,B,C	78
β sesquipedale	i.	160	—	—	
γ pinnatum	i.	160	—	—	
δ uniforme	i.	160	—	—	
ε capillaceum	i.	160	—	—	
ζ latifolium	i.	160	—	59 B,C	
η confertum	i.	160	—	—	
θ flexuosum	i.	161	—	—	
ι aculeatum	i.	161	—	—	
κ abnorme	i.	161	—	—	
λ pulchellum	i.	161	—	—	
μ claviferum	i	161	—	—	
ν clavatum	i.	161	—	—	
ο crinale	i.	161	—	—	
coronopifolium	i.	149	—	54	
neglectum	ii.	73	—	94	
pinnatifidum	i.	81	—	32	
rostratum	i.	122	—	42 A,B	
versicolor	i.	157	—	58	
Gigartina, 50					
acicularis	ii.	57	—	89	115
articulata	ii.	27	—	75	
capillaris	ii.	79	—	97	
clavellosa	ii.	29	—	76	
compressa	i.	153	—	56	
confervoides	i.	151	—	55	
dasyphylla	i.	7	8	4	
erecta	ii.	19	20	—	
flagelliformis	iii.	107	—	167	

	Vol.	Page	Diss.	Plate	Syn.
Gigartina					
Griffithsiæ	ii.	41	—	82	
kaliformis	i.	87	—	35	
lubrica	ii.	79	—	97	
lycopodioides	i.	5	—	3	
mamillosa	ii.	61	—	90	117
Opuntia	ii.	25	26	—	
pedunculata	iii.	39	—	145	
pilosa	ii.	25	26	—	
pinastroides	i.	17	—	9	
pistillata	ii.	55	—	88	114
plicata	ii.	47	—	84	
purpurascens, γ rostrata	i.	121	—	42 A,B	
β cirrhosa	ii.	49	—	85	
purpurascens	ii.	49	—	85	
rotunda	i.	165	—	60	
subfusca	i.	3	—	2	
Teedii	ii.	59	60	—	116
tenuissima	i.	9	—	5	
vermicularis	i.	85	—	34	
viridis	iii.	35	36	—	
Ginannia					
furcellata	i.	183	—	64	
β subcostata	i.	183	—	64	
Gloiosiphonia, 56					
capillaris	ii.	79	—	97	124
Gongroceras					
Deslongchampii	ii.	95	—	101	
fastigiatum	ii.	107	108	—	
strictum	ii.	103	—	103	
Goniotrichum					
ceramicola, var. α simplex	iv.	137	138	—	
ceramicola	iv.	139	140	—	
Gracilaria, 20					
confervoides	i.	151	—	55	74
compressa	i.	153	—	56	75
erecta	ii.	19	20	—	
multipartita	i.	155	—	57	76
polycarpa	i.	155	—	57	
purpurascens	ii.	49	—	85	
Grammita					
rigidula	i.	19	—	10	
Wulfeni	i.	15	—	8	
Grateloupia, 54					
filicina	ii.	73	—	94	121
porracea	ii.	73	—	94	
Griffithsia, 63					
barbata	ii.	131	132	—	145
corallina	ii.	135	—	113	147
corallina, β	ii.	137	—	114	
crassa	ii.	137	—	114	
Devoniensis	ii.	133	134	—	146
equisetifolia	ii.	127	—	112	144
var. simplicifilum	ii.	127	—	—	
intermedia	ii.	137	—	114	
irregularis	ii.	141	—	116	
multifida	i.	185	—	65	
β pilifera	i.	185	—	65	
nodulosa	ii.	119	—	109	
secundiflora	ii.	137	—	114	148
setacea	ii.	139	—	115	149

	Vol.	Page	Diss.	Plate	Syn.
Gymnogongrus, 45					
Griffithsiæ	ii.	41	—	82	108
Norvegicus	ii.	45	—	83	109
plicatus	ii.	47	—	84	
Hafgygia					
digitata	iii.	45	—	147	
var. stenophylla	iii.	47	—	—	
Halarachnion					
ligulatum	ii.	69	—	92 A, B	
Halerica					
ericoides	iii.	3	—	131	
Halidrys, 67					
nodosa	iii.	23	—	139	
siliquosa	iii.	1	—	130	180
Haligenia					
bulbosa	iii.	49	—	148	
Haliseris, 80					
dichotoma	iii.	81	—	158	
polypodioides	iii.	69	—	155	201
Haloglossum					
Griffithsianum	iii.	97	—	165	
Halopithysis					
pinastroides	i.	17	—	9	
Halopteris					
filicina	iii.	149	—	171	
Halurus					
equisetifolius	ii.	127	—	112	
Halymenia, 52					
ciliaris	ii.	51	—	86	
ciliata	i.	145	—	52	
Dubyi	ii.	75	—	95	
edulis	ii.	77	—	96	
elongata	ii.	69	—	92 A, B	
filiformis	ii.	23	—	74	
furcellata	i.	183	—	64	
β subcostata	i.	183	—	64	
laminarioides	ii.	75	—	95	
ligulata	ii.	69	—	92 A, B	190
ocellata	i.	140	—	—	
opuntia	ii.	25	26	—	
palmata	ii.	11	—	70	
Palmetta	ii.	9	—	69	
purpurascens, β crispata	ii.	23	—	74	
reniformis	ii.	53	—	87	
Hapalidium, 15					
confervicola	i.	119	120	—	
phyllactidium	i.	119	120	—	60
Helicothamnion					
scorpioides	i.	11	—	6	
Helminthocladia, 29					
purpurea	i.	179	—	62	86
vermicularis	iii.	111	—	168	
virescens	iii.	115	116	—	
Helminthora, 30					
multifida	i.	177	—	61	
divaricata	i.	181	—	63	87
Hildenbrandtia, 24					
Nardi	i.	169	170	—	

	Vol.	Page	Diss.	Plate	Syn.
Hildenbrandtia					
rubra	i.	169	170	—	81
rubra	iii.	121	122	—	
Himanthalia, 71					
lorea	iii.	29	—	141	193
Hormidium					
flaccum	iv.	177	178	—	
Hormoceras					
decurrens, β majus	ii.	93	94	—	
diaphanum	ii.	99	—	102	
gracillimum	ii.	101	102	—	
nodosum	ii.	105	—	104	
Hormospora, 122					
ramosa	iv.	209	210	—	376
Hormotrichum					
Carmichaelii	iv.	173	174	—	
collabens	iv.	95	96	—	
flaccum	iv.	177	178	—	
isogonum	iv.	99	100	—	
speciosum	iv.	175	176	—	
Younganum	iv.	99	100	—	
Hutchinsia					
Agardhiana	i.	59	—	22	
Allochroa, β fibrata	i.	27	—	13	
atro-rubescens	i.	59	—	22	
badia	i.	59	—	22	
Brodiæi	i.	45	—	18	
byssoides	i.	67	—	25	
coccinea	i.	69	—	26	
elongata	i.	37	—	15	
fastigiata	i.	63	—	23	
fibrillosa	i.	43	—	17	
filamentosa	ii.	81	—	98	
fruticulosa	i.	15	—	8	
fucoides	i.	53	—	20	
furcellata	i.	61	—	22½	
lubrica	i.	43	—	17	
Möstingii	i.	65	—	24	
nigrescens	i.	53	—	20	
obscura	i.	49	50	—	
ocellata	i.	75	—	29	
parasitica	i.	65	—	24	
patens	i.	21	—	11	
penicillata	i.	45	—	18	
pilosa	i.	43	—	17	
pulvinata	i.	25	26	—	
Ruchingeri	i.	37	—	15	
subulifera	i.	57	—	21	
urceolata	i.	21	—	11	
violacea	i.	39	—	16	
Wulfeni	i.	15	—	8	
Hypnea					
confervoides	i.	151	—	55	
purpurascens	ii.	49	—	85	
purpurascens, β	ii.	49	—	85	
Hypoglossum					
alatum	i.	121	—	42 A, B	
ruscifolium	i.	127	—	44	
Woodwardii	i.	125	—	43	
Ilea					
compressa	iv.	107	—	199	
intestinalis	iv.	105	—	198	

	Vol.	Page	Diss.	Plate	Syn.
Iridæa					
Dubyi	ii.	75	—	95	
edulis	ii.	77	—	96	
reniformis	ii.	53	—	87	
Jania, 13					
corniculata	i.	99	—	40	50
rubens	i.	97	—	39	49
Kallymenia, 49					
Dubyi	ii.	75	—	95	
reniformis	ii.	53	—	87	113
Lamarckia					
bursa	iv.	1	2	—	
Laminaria, 77					
Belvisii	iii.	49	—	148	
bulbosa	iii.	49	—	148	202
cæspitosa	iii	59	—	151	
conica	iii.	47	—	—	
cuneata	iii.	59	—	151	
debilis	iii.	59	—	151	
digitata	iii.	45	—	147	201
var. stenophylla	iii.	47	—	—	
esculenta	iii.	43	—	146	
fascia	iii.	59	—	151	206
latifolia	iii.	55	—	149	
ligulata	iii.	31	—	142	
longicruris	iii.	53	54	—	203
ophiura	iii.	53	54	—	
papyrina	iii.	59	—	151	
plantaginea	iii.	93	—	164	
Phyllitis	iii.	57	—	150	205
saccharina	iii.	55	—	149	204
saccharina, young state	iii.	57	—	150	
saccharina, var. attenuata	iii.	57	—	150	
stenoloba	iii.	45	—	147	
Lamourouxia					
turgidula	i.	61	—	22½	
Laurencia, 9					
cæspitosa	i.	7	8	4	
cæspitosa	i.	83	—	33	42
cyanosperma	i.	79	—	31	
dasyphylla	i.	7	8	4	
gelatinosa	i.	79	—	31	
hybrida	i.	83	—	33	
intricata	i.	79	—	31	
lutea	i.	79	—	31	
obtusa	i.	79	—	31	40
pinnatifida	i.	81	—	32	41
γ angusta	i.	83	—	33	
β squarrosa	i.	7	—	4	
tenuissima	i.	9	—	5	
Leathesia, 92					
Berkeleyi	iii.	119	120	—	234
difformis	iii.	117	118	—	
marina	iii.	117	118	—	
tuberiformis	iii.	117	118	—	233
Leibleinia					
cæspitula	iv.	167	168	—	
confervicola	iv.	153	154	—	
luteola	iv.	155	156	—	
purpurea	iv.	153	154	—	
semiplena	iv.	163	164	—	
Lichen					
corrugatus	iv.	143	144	—	

	Vol.	Page	Diss.	Plate	Syn.
Linckia					
atra	iv.	145	146	—	
clavata	iii.	143	144	—	
hemisphærica	iv.	145	146	—	
punctiformis	iii.	141	142	—	
Lithophyllum					
decussatum	i.	107	108	—	
expansum	i.	107	108	—	
Lithothamnion					
calcareum	i.	103	104	—	
crassum	i.	105	106	—	
fasciculatum	i.	105	106	—	
lichenoides	i.	109	110	—	
polymorphum	i.	101	—	41	
Litosiphon, 89					
Laminariæ	iii.	105	106	—	227
pusillus	iii.	103	104	—	226
Lithocystis					
Allmanni	i.	119	120	—	
Lomentaria, 10					
articulata	ii.	27	—	75	
kaliformis	i.	87	—	35	44
Opuntia	ii.	25	26	—	
ovalis	i.	85	—	34	43
parvula	i.	91	—	36	
β patens	i.	88	—	—	
pygmæa	i.	89	90	—	
reflexa	i.	89	90	—	45
γ squarrosa	i.	88	—	—	
Lophura					
cymosa	i.	3	4	2	
lycopodioides	i.	5	6	3	
Lyngbya, 115					
æruginosa	iv.	171	172	—	
Carmichaelii	iv.	173	174	—	358
crispa	iv.	169	—	207	
crispa	iv.	173	174	—	
Cutleriæ	iv.	179	180	—	361
ferruginea	iv.	171	172	—	357
flacca	iv.	177	178	—	360
lutescens	iv.	163	164	—	
majuscula	iv.	169	—	207	356
semiplena	iv.	163	164	—	
speciosa	iv.	175	176	—	359
subsalsa	iv.	171	172	—	
Mastophora					
lichenoides	i.	109	110	—	
Mastocarpus					
mamillosus	ii.	61	—	90	
Melobesia, 14					
agariciformis	i.	107	108	—	54
calcarea	i.	103	104	—	52
decussata	i.	107	108	—	
expansa	i.	107	108	—	
farinosa	i.	113	114	—	57
fasciculata	i.	105	106	—	53
granulata	i.	113	114	—	
lichenoides	i.	109	110	—	55
licheniformis	i.	109	110	—	
membranacea	i.	111	112	—	56
polymorpha	i.	101	—	41	51
pustulata	i.	117	118	—	59
verrucata	i.	115	116	—	58

	Vol.	Page	Diss.	Plate	Syn.
Mertensia					
tripinnata	ii.	183	184	—	
Mesogloia, 91					
affinis	iii.	115	116	—	
attenuata	ii.	119	—	109	
Balani	i.	177	—	61	
capillaris	ii.	79	—	97	
coccinea	ii.	117	118	—	
divaricata	i.	181	—	63	
divaricata	iii.	109	110	—	
Griffithsiana	iii.	113	114	—	231
Hornemanni	iii.	115	116	—	
Hudsoni	i.	181	—	63	
Hudsoni	ii.	69	—	92 A, B	
moniliformis	ii.	119	—	109	
multifida	i.	177	—	61	
purpurea	i.	179	—	62	
vermicularis	iii.	111	—	168	230
virescens	iii.	115	116	—	232
Microcoleus, 116					
anguiformis	iv.	181	182	—	362
Microcladia, 58					
glandulosa	ii.	83	—	99	126
Millepora					
agariciformis	i.	107	108	—	
byssoides β fasciculus	i.	109	110	—	
calcarea	i.	103	104	—	
coriacea	i.	107	108	—	
decussata	i.	107	108	—	
fasciculata	i.	105	106	—	
lichenoides	i.	109	110	—	
polymorpha	i.	101	—	41	
tortuosa	i.	107	108	—	
Monormia, 119					
intricata	iv.	195	196	—	369
Mosco					
petroso	i.	107	108	—	
Myelomium					
furcellatum	i.	183	—	64	
Myrionema, 95					
breviarticulatum	iii.	125	126	—	
clavatum	iii.	143	144	—	246
fucicolum	iii.	123	124	—	
Leclancherii	iii.	139	140	—	244
punctiforme	iii.	141	142	—	245
stellulatum	iii.	129	130	—	
strangulans	iii.	137	138	—	243
velutinum	iii.	135	136	—	
Myriotrichia, 99					
clavæformis	iii.	197	198	—	273
filiformis	iii.	199	200	—	274
Naccaria, 33					
Wigghii	i.	187	—	66	90
Nemaleon, 28					
adhærens	i.	173	174	—	
multifidum	i.	177	—	61	85
purpureum	i.	179	—	62	
Nemastoma					
Dubyi	ii.	75	—	95	
Nitophyllum, 17					
Bonnemaisoni	i.	131	—	46	65
Nitophyllum					
Gmelini	i.	133	—	47	66
Hilliæ	i.	135	—	48	67
laceratum	i.	137	—	49	68
ocellatum	i.	140	—	—	
Pollexfenii	i.	141	—	—	
punctatum	i.	139	—	50	69
β ocellatum	i.	140	—	—	
γ crispatum	i.	141	—	—	
δ Pollexfenii	i.	141	—	—	
δ Alliaceum	i.	141	—	—	
ulvoideum	i.	135	—	48	
versicolor	i.	143	—	51	70
Nostoc					
marinum	iii.	117	118	—	
Nullipora					
agariciformis	i.	107	108	—	
calcarea	i.	103	104	—	
fasciculata	i.	105	106	—	
fragilis	i.	103	104	—	
polymorpha	i.	101	—	41	
Ochlochæte, 106					
hystrix	iv.	101	102	—	323
Odonthalia, 1					
dentata	i.	1	2	1	1
Oncotylus					
Norvegicus	ii.	45	—	83	
Oscillatoria, 117					
confervicola	iv.	153	159	—	
insignis	iv.	191	192	—	367
littoralis	iv.	183	184	—	363
nigro-viridis	iv.	187	188	—	365
scopulorum	iv.	159	160	—	
spiralis	iv.	185	186	—	364
subuliformis	iv.	189	191	—	366
subsalsa	iv.	185	186	—	
Ozothallia					
vulgaris	iii.	23	—	139	
Padina, 81					
atomaria	iii.	79	—	157	
collaris	iii.	75	76	—	
deusta	iii.	122	122	—	
Mediterranea	iii.	71	—	156	
omphalodes	iii.	75	76	—	
parvula	iii.	77	78	—	
Pavonia	iii.	71	—	156	211
phasiana	iii.	79	—	157	
reptans	iii.	77	78	—	
Padinella					
parvula	iii.	77	78	—	
Pelvetia					
canaliculata	iii.	27	—	140	
Petrocelis, 25					
cruenta	i.	171	172	—	82
Peyssonelia, 23					
Dubyi	i.	167	168	—	80
Phycocastanum					
bulbosum	iii.	49	—	148	
Phycolapathum					
debile	iii.	91	—	163	
Phycophila					
Agardhii	iii.	123	124	—	

	Vol.	Page	Diss.	Plate	Syn.
Phycophila					
flaccida	iii.	125	126	—	
fucorum	iii.	123	124	—	
Phycoseris					
Linza	iv.	127	—	204	
Phyllacantha					
Boryana	iii.	5	—	132	
fibrosa	iii.	11	—	134	
Phyllactidium					
confervicola	i.	119	—	120	
Phyllophora, 44					
Brodiæi	ii.	37	—	80	106
β simplex	ii.	39	—	81	
membranifolia	ii.	35	—	79	105
palmettoides	ii.	39	—	81	107
rubens	ii.	33	—	78	104
Physactis					
lobata	iv.	147	148	—	
Physocaulon					
Mackaii	iii.	25	26	—	
nodosum	iii.	23	—	139	
Phlebothamnion					
arbuscula	ii.	159	—	119	
corymbosum	ii.	189	—	128	
Hookeri	ii.	169	—	124	
polyspermum	ii.	175	176	—	
roseum	ii.	171	—	125	
spinosum	ii.	169	—	124	
tetricum	ii.	167	—	123	
versicolor	ii.	189	—	128	
Plocamium, 35					
amphibium	i.	11	—	6	
asparagoides	i.	77	—	30	
Binderianum	ii.	5	—	68	
coccineum	ii.	5	—	68	92
β uncinata	ii.	5	—	68	92
cristatum	i.	13	—	7	
elegans	ii.	125	—	111	
Lyngbyanum	ii.	5	—	68	
plumosum	ii.	121	—	110	
vulgare	ii.	5	—	68	
Plocaria					
compressa	i.	153	—	56	
erecta	ii.	19	20	—	
multipartita	i.	155	—	57	
polycarpa	i.	155	—	57	
purpurascens	ii.	49	—	85	
Pollicipora					
agariciformis	i.	107	108	—	
Polyides, 22					
Griffithsiæ	ii.	41	—	82	
lumbricalis	i.	165	—	60	
rotundatus	i.	165	—	60	79
Polysiphonia, 6					
affinis	i.	55	56	—	28
Agardhiana	i.	59	—	22	
atro-rubescens	i.	59	—	22	30
badia	i.	59	—	22	
Brodiæi	i.	45	—	18	23
byssoides	i.	67	—	25	34
Carmichaeliana	i.	41	42	—	21
chalarophlæa	i.	37	—	15	
clavigera	i.	37	—	15	

	Vol.	Page	Diss.	Plate	Syn.
Polysiphonia					
cristata	i.	13	—	7	
denudata	i.	59	—	22	
divaricata	i.	41	42	—	
divergens γ Grevilleana	i.	51	52	—	
elongata	i.	37	—	15	19
elongella	i.	35	—	14	18
fastigiata	i.	63	—	23	32
fibrata	i.	27	—	13	14
fibrillosa	i.	43	—	17	22
formosa	i.	23	—	12	12
fruticulosa	i.	15	—	8	
fucoides	i.	53	—	20	
furcellata	i.	61	—	22½	31
gracilis	i.	23	—	12	
Griffithsiana	i.	33	34	—	17
macrocarpa	i.	25	26	—	
nigrescens	i.	53	—	20	27
obscura	i.	49	50	—	25
parasitica	i.	65	—	24	33
patens	i.	21	—	11	
pulvinata	i.	25	26	—	13
Richardsoni	i.	31	32	—	16
rosea	i.	37	—	15	
Ruchingeri	i.	37	—	15	
simulans	i.	51	52	—	26
spinulosa	i.	29	30	—	15
spinulosa	i.	51	52	—	
stenocarpa	i.	37	—	15	
subulifera	i.	57	—	21	29
thuyoides	i.	19	—	10	
urceolata	i.	21	—	11	11
variegata	i.	47	—	19	24
violacea	i.	39	—	16	20
Wulfeni	i.	15	—	8	
Porphyra, 109					
laciniata	iv.	129	—	205	337
linearis	iv.	131	—	206	
purpurea	iv.	131	—	206	
umbilicalis	iv.	129	—	205	
vulgaris	iv.	131	—	206	338
β linearis	iv.	131	—	206	
Ptilota, 62					
elegans	ii.	125	—	111	143
plumosa	ii.	121	—	110	142
β capillaris	ii.	125	—	111	
γ tenuissima	ii.	125	—	111	
sericea	ii.	125	—	111	
Punctaria, 87					
latifolia	iii.	91	—	163	220
plantaginea	iii.	93	—	164	221
tenuissima	iii.	95	96	—	222
undulata	iii.	95	96	—	
Pycnophycus, 69					
tuberculatus	iii.	13	—	135	186
Ralfsia, 93					
verrucosa	iii.	121	122	—	235
deusta	iii.	121	122	—	
Rhizoclonium, 104					
Casparyi	iv.	75	76	—	310
obtusangulum	iv.	73	74	—	
riparium	iv.	73	74	—	309

	Vol.	Page	Diss.	Plate	Syn.
Rhododermis					
Drummondii	i.	169	170	—	
Rhodomela, 2					
dentata	i.	1	—	1	
lycopodioides	i.	5	—	3	3
pinastroides	i.	17	—	9	
scorpioides	i.	11	—	6	
subfusca	i.	3	—	2	2
Rhodophyllis, 37					
bifida	ii.	15	—	71	95
Rhodymenia, 36					
bifida	ii.	15	—	71	
β ciliata	ii.	15	—	71	
γ incrassata	ii.	15	—	71	
ciliata	i.	145	—	52	
cristata	ii.	17	—	72	
jubata	i.	147	—	53	
laciniata	ii.	51	—	86	
membranifolia	ii.	35	—	79	
palmata	ii.	11	—	70	94
Palmetta	ii.	9	—	69	93
β Nicæensis	ii.	9	—	—	
polycarpa	i.	155	—	57	
reniformis	ii.	53	—	87	
rostrata	i.	121	—	42 A, B	
Teedii	ii.	59	60	—	
Rhynchococcus					
coronopifolius	i.	149	—	54	
Rivularia, 111					
atra	iv.	145	146	—	344
bullata	iv.	147	148	—	
Leclancherii	iii.	139	140	—	
multifida	i.	177	—	61	
nitida	iv.	147	148	—	345
opuntia	ii.	25	26	—	
plicata	iv.	143	144	—	343
tuberiformis	iii.	117	118	—	
verticillata	ii.	117	118	—	
vermiculata	iii.	111	—	168	
Rytiphlæa, 5					
complanata	i.	13	—	7	7
fruticulosa	i.	15	—	8	8
pinastroides	i.	17	—	9	9
thuyoides	i.	19	—	10	10
Saccorhiza					
bulbosa	iii.	49	—	148	
Sarcophyllis					
lobata	ii.	53	—	87	
Schizosiphon, 112					
Warreniæ	iv.	149	150	—	346
Schizothrix, 113					
Cresswellii	iv.	151	152	—	347
Schizymenia, 55					
Dubyi	ii.	75	—	95	122
edulis	ii.	77	—	96	123
Scinaia, 31					
furcellata	i.	183	—	64	88
β subcostata	i.	183	—	64	
Scytochloria					
nitida	iv.	147	148	—	

	Vol.	Page	Diss.	Plate	Syn.
Scytonema					
effusum	iv.	171	172	—	
hydnoides	iv.	165	166	—	
Scytosiphon					
clathratus	iv.	113	114	—	
compressus	iv.	107	—	199	
γ confervoides	iv.	119	120	—	
erectus	iv.	111	—	200	
fœniculaceus	iii.	87	—	161	
filum	iii.	61	—	152	
var. γ	iii.	65	—	153	
var. fistulosum	iii.	101	—	166	
hippuroides	ii.	47	—	84	
intestinalis	iv.	103	104	—	
γ cornucopiæ	iv.	103	104	—	
intestinalis	iv.	105	—	198	
lomentarium	iii.	65	—	153	
olivascens	iii.	89	—	162	
paradoxus	iii.	85	—	160	
paradoxus	iv.	113	114	—	
Seirospora, 65					
Griffithsiana	ii.	143	—	117	151
Solenia					
attenuata	iii.	89	—	162	
Bertoloni	iv.	105	—	198	
clathrata	iv.	113	114	—	
var. confervoides	iv.	111	—	200	
compressa	iv.	107	—	199	
crinita	iii.	89	—	162	
fuscata	iii.	65	—	153	
intestinalis	iv.	105	—	198	
γ cornucopiæ	iv.	103	104	—	
Linza	iv.	127	—	204	
percursa	iv.	119	120	—	
Spermatochnus					
paradoxus	iii.	85	—	160	
rhizodes	iii.	83	—	159	
Spermosira, 121					
Harveyana	iv.	207	207	—	375
litorea	iv.	205	206	—	374
Sphacelaria, 97					
cirrhosa	iii.	157	158	—	253
ζ simplex	iii.	162	162	—	
filicina	iii.	149	—	171	249
β patens	iii.	151	152	—	
fusca	iii.	159	160	—	254
hypnoides	iii.	149	—	171	
olivacea	iii.	161	162	—	
pennata	iii.	157	158	—	
plumosa	iii.	155	—	173	252
racemosa	iii.	163	164	—	256
radicans	iii.	161	162	—	255
scoparia	iii.	153	—	172	251
scoparioides	iii.	153	—	172	
sertularia	iii.	151	152	—	250
simpliciuscula	iii.	149	—	171	
velutina	iii.	135	136	—	
Sphærococcus, 19					
acicularis	ii.	57	—	89	
bifidus	ii.	15	—	71	
Brodiæi	ii.	37	—	80	
cartilagineus	i.	157	—	58	
ciliatus	i.	145	—	52	

	Vol.	Page	Diss.	Plate	Syn.
Sphærococcus					
ciliatus	i.	147	—	53	
var. jubatus	i.	147	—	53	
linearis	i.	147	—	53	
angustus	i.	147	—	53	
spinosus	i.	174	—	53	
compressus	i.	153	—	56	
confervoides	i.	151	—	55	
corneus	i.	159	—	59 A, B, C	
coronopifolius	i.	149	—	54	73
crispus	ii.	65	—	91	
cristatus	ii.	17	—	72	
erectus	ii.	19	20	—	
gigartinus	ii.	55	—	88	
Griffithsiæ	ii.	41	—	82	
jubatus	i.	147	—	53	
laciniatus	ii.	51	—	86	
lichenoides	i.	153	—	56	
mamillosus	ii.	61	—	90	
membranifolius	ii.	35	—	79	
multipartitus	i.	155	—	57	
Norvegicus	ii.	45	—	83	
palmatus	ii.	11	—	70	
Palmetta	ii.	9	—	69	
plicatus	ii.	47	—	84	
polycarpus	i.	155	—	57	
purpurascens	ii.	49	—	85	
rubens	ii.	33	—	78	
subfuscus	i.	3	4	2	
Sphærozyga, 120					
Berkeleyana	iv.	203	203	—	373
Broomei	iv.	201	201	—	372
Carmichaelii	iv.	197	198	—	370
Thwaitesii	iv.	199	200	—	371
Spirillum					
rupestre	iv.	185	186	—	
Spirulina, 118					
tenuissima	iv.	193	194	—	368
Spongiocarpus					
rotundus	i.	165	—	60	
Spongiomorpha					
uncialis	iv.	55	56	—	
Spongites					
calcarea	i.	103	104	—	
Spongodium					
Bursa	iv.	1	2	—	
commune	iv.	7	—	183	
tomentosum	iv.	7	—	183	
Sporochnus, 74					
aculeatus	iii.	33	—	143	
Cabreræ	iii.	41	42	—	
ligulatus	iii.	31	—	142	
multifidus	iii.	67	—	154	
pedunculatus	iii.	39	—	145	198
rhizodes	iii.	83	—	159	
β paradoxa	iii.	85	—	160	
villosus	iii.	37	—	144	
viridis	iii.	35	36	—	
Spyridia, 57					
crassiuscula	ii.	81	—	98	
filamentosa	ii.	81	—	98	125
Spyridia					
mediuscula	ii.	81	—	98	
setacea	ii.	81	—	98	
Stenogramme, 40					
Europæa	ii.	21	—	73	
interrupta	ii.	21	—	73	98
Stilophora, 84					
crinita	iii.	89	—	162	
Lyngbyæi	iii.	85	—	160	217
rhizodes	iii.	83	—	159	216
Striaria, 86					
attenuata	iii.	89	—	162	219
Grevilleana	iii.	85	—	160	
Stypopodium					
atomarium	iii.	79	—	157	
scoparium	iii.	153	—	172	
Symplaca					
hydnoides	iv.	165	166	—	
Taonia					
atomaria	iii.	79	—	157	
Tetraspora					
intestinalis	iv.	105	—	198	
Tremella					
difformis	iii.	117	118	—	
hemispherica	iv.	145	146	—	
Trentepohlia					
Daviesii	ii.	201	203	—	
floridula	ii.	195	196	—	
purpurea	ii.	193	194	—	
Rothii	ii.	193	194	—	
sparsa	ii.	199	200	—	
Tricholadia					
vermicularis	iii.	111	—	168	
virescens	iii.	115	116	—	
Trichothamnion					
coccineum	i.	69	—	26	
Tylocarpus					
Griffithsiæ	ii.	41	—	82	
plicatus	ii.	47	—	84	
tentaculatus	ii.	41	—	82	
Ulva, 108					
atomaria	iii.	79	—	157	
attenuata	iii.	89	—	162	
articulata β	ii.	25	26	—	
articulata	ii.	27	—	75	
bulbosa	iii.	49	—	148	
clathrata	iv.	113	114	—	
compressa	iv.	107	—	199	
cucullata	iii.	71	—	156	
dichotoma	iii.	81	—	158	
edulis	ii.	77	—	96	
filiformis	ii.	23	—	74	
fistulosa	iii.	101	—	166	
furcellata	i.	183	—	64	
interrupta	i.	183	—	64	
intestinalis	iv.	103	134	—	
γ cornucopiæ	iv.	105	—	198	
laciniata	iv.	129	—	205	
Lactuca	iv.	123	—	202	
var. latissima	iv.	123	—	202	
Lactuca	iv.	125	—	203	335

	Vol.	Page	Diss.	Plate	Syn.
Ulva					
latissima	iv.	123	—	202	334
ligulata	i.	125	—	43	
ligulata	ii.	69	—	92 A, B	
Linza	iv.	127	—	204	336
multifida	iii.	67	—	154	
Pavonia	iii.	71	—	156	
plantaginea	iii.	93	—	164	
plantaginifolia	iii.	93	—	164	
plantaginifolia	iii.	95	96	—	
plumosa	iv.	11	—	184	
polypodioides	iii.	69	—	155	
punctata	i.	139	—	50	
purpurea	iv.	131	—	206	
ramulosa	iv.	115	—	201	
rubens	i.	181	—	63	
rubra	ii.	69	—	92 A, B	
serrata	iii.	79	—	157	
Turneri	iii.	99	100	—	
umbilicalis	iv.	129	—	205	
uncinata	iv.	115	—	201	
Vaucheria, 102					
dichotoma β submarina	iv.	17	18	—	
marina	iv.	15	16	—	282
submarina	iv.	17	18	—	281
velutina	iv.	19	20	—	283
Wormskioldia, 34					
alata	i.	121	—	42 A, B	
hypoglossum	i.	125	—	43	
lacerata	i.	137	—	49	
ocellata	i.	140	—	—	
punctata	i.	139	—	50	
ruscifolia	i.	127	—	44	
sanguinea	ii.	1	—	67	91
sinuosa	i.	129	—	45	
Wrangelia, 32					
multifida	i.	185	—	65	89
β pilifera	i.	185	—	65	
Zanardinia					
prototypus	iii.	75	76	—	
Zonaria, 82					
atomaria	iii.	79	—	157	
collaris	iii.	75	76	—	212
dichotoma	iii.	81	—	158	
deusta	iii.	121	122	—	
lineolata	iii.	89	—	162	
multifida	iii.	67	—	154	
Naccariana	iii.	89	—	162	
parvula	iii.	77	78	—	213
Pavonia	iii.	71	—	156	
plantaginea	iii.	93	—	164	
rosea	i.	109	110	—	
Zygnema					
littoreum	iv.	73	74	—	

THE END.

BRADBURY AND EVANS,
PRINTERS EXTRAORDINARY TO THE QUEEN,
WHITEFRIARS.

Oct 6 1915

THE PUBLIC LIBRARY

OF THE

NOT TO BE

OF BOSTON